OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

APR 26

APRIL 16, 1951
VOLUME 40, No. 8

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

Knitting Arts Exhibition Number

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highest possible light fastness for Nylon

DU PONT NEUTRACYL DYES—neutral dyeing colors—have been specifically developed to give the highest possible light and wet fastness on both filament and staple nylon. They can be applied in the same short time cycle as acid dyes.

These new dyes, such as Neutracyl Red B, are especially recommended for dyeing nylon staple. Fabrics made from staple dyed with these new colors provide the superior light fastness needed for upholstery materials, outerwear, pile fabrics, suitings, automotive top materials, government fabrics and infants' wear. They are also suitable for dyeing wool, giving similar fastness properties.

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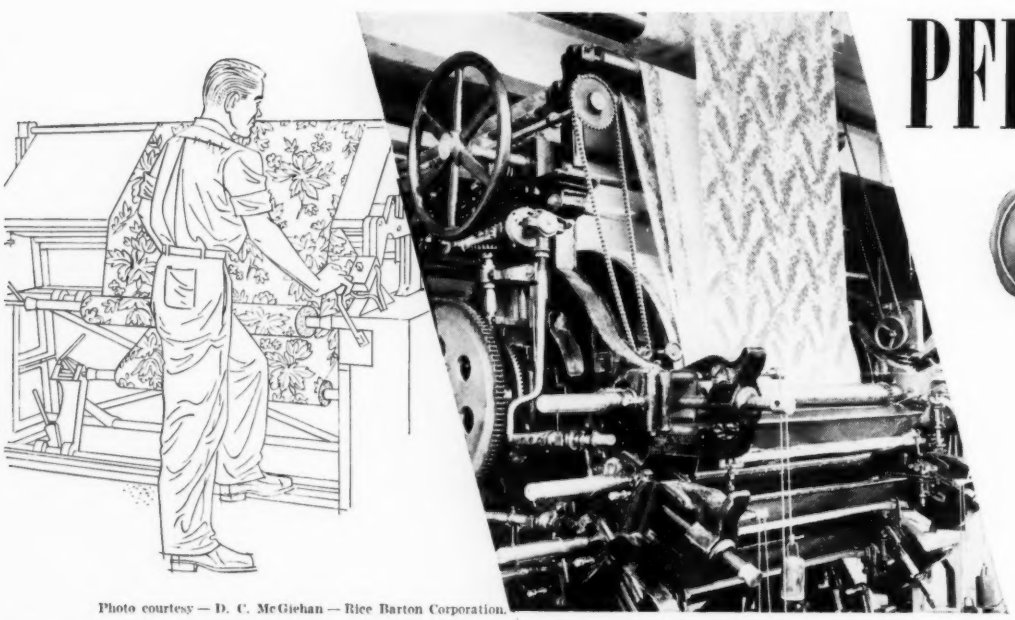

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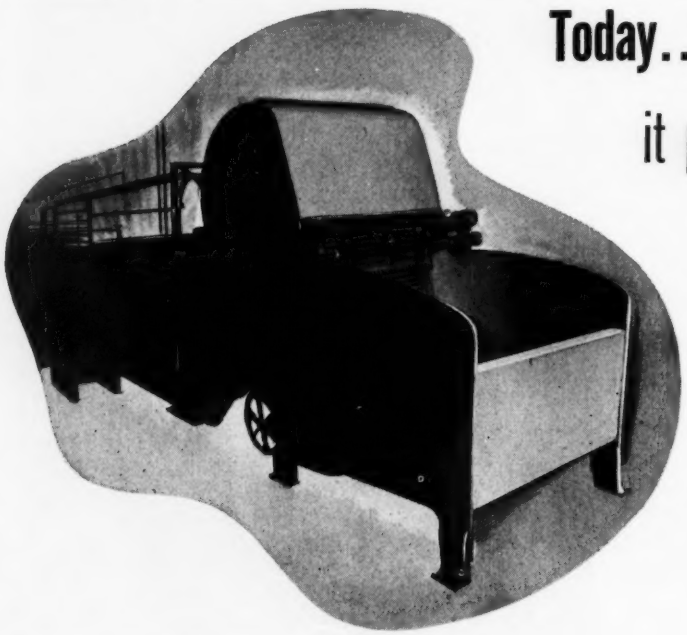

Today... more than ever it pays to use Sterox* 6 for wool scouring

While soap prices climb, many mills today are *slashing* wool scouring costs UP TO 50% — using a new, different detergent, Monsanto's Sterox 6.

By switching to Sterox, you use *less* detergent . . . and cut costs; you use *less* Soda Ash . . . and cut costs (see case history below) — yet you get *full* efficiency. Sterox removes grease and oil almost completely AND holds them in suspension without redeposition on the fibers.

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	Sterox	Soda Ash
Amt./100 lbs. grease wool	.21 lbs.	1.56 lbs.
Price	@ .32/lb.	@ .015/lb.
Chemical Cost/ 100 lbs. grease wool	.067	.023
Total Chemical Cost 100 lbs. grease wool		.090

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	Soap	Soda Ash
Amt./100 lbs. grease wool	.62 lbs.	1.88 lbs.
Price	@ .245/lb.	@ .015/lbs.
Chemical Cost/ 100 lbs. grease wool	.152	.028
Total Chemical Cost 100 lbs. grease wool		.180

For loftier wool . . . for real dollar savings in wool scouring, it'll pay YOU *to investigate Monsanto's Sterox 6 for your mill . . .* TODAY.

Case history of a dollar doing the work of two... with Sterox 6

After keeping careful cost records for two weeks with soap, ... mill scoured 99,086 pounds of grease wool with Sterox 6. The wool in both test periods included 58's, 60's and No. 4's in unblended lots. Shrinkage: 30%-40%; residual grease content for both tests: 0.5% or less. Total time: 52 hours; but, during two 8-hour shifts, 20,500 lbs. per shift were scoured to check efficiency of Sterox 6 at peak loads.

Equipment and procedure: Equipment included 4-bowl trains, counterflow from #4 to #1 to centrifuge. Automatic blowdown of bowls 1 and 2. Rotameter feed of chemicals to bowls 2 and 3. *Bowls were not dumped* (liquor lost only during automatic blowdowns).

Results: Scouring cost with Sterox 6 was one-half of the scouring cost with soap. During peak loads, chemical costs were still less. Grease recovery with Sterox was comparable to that in the control test with soap.

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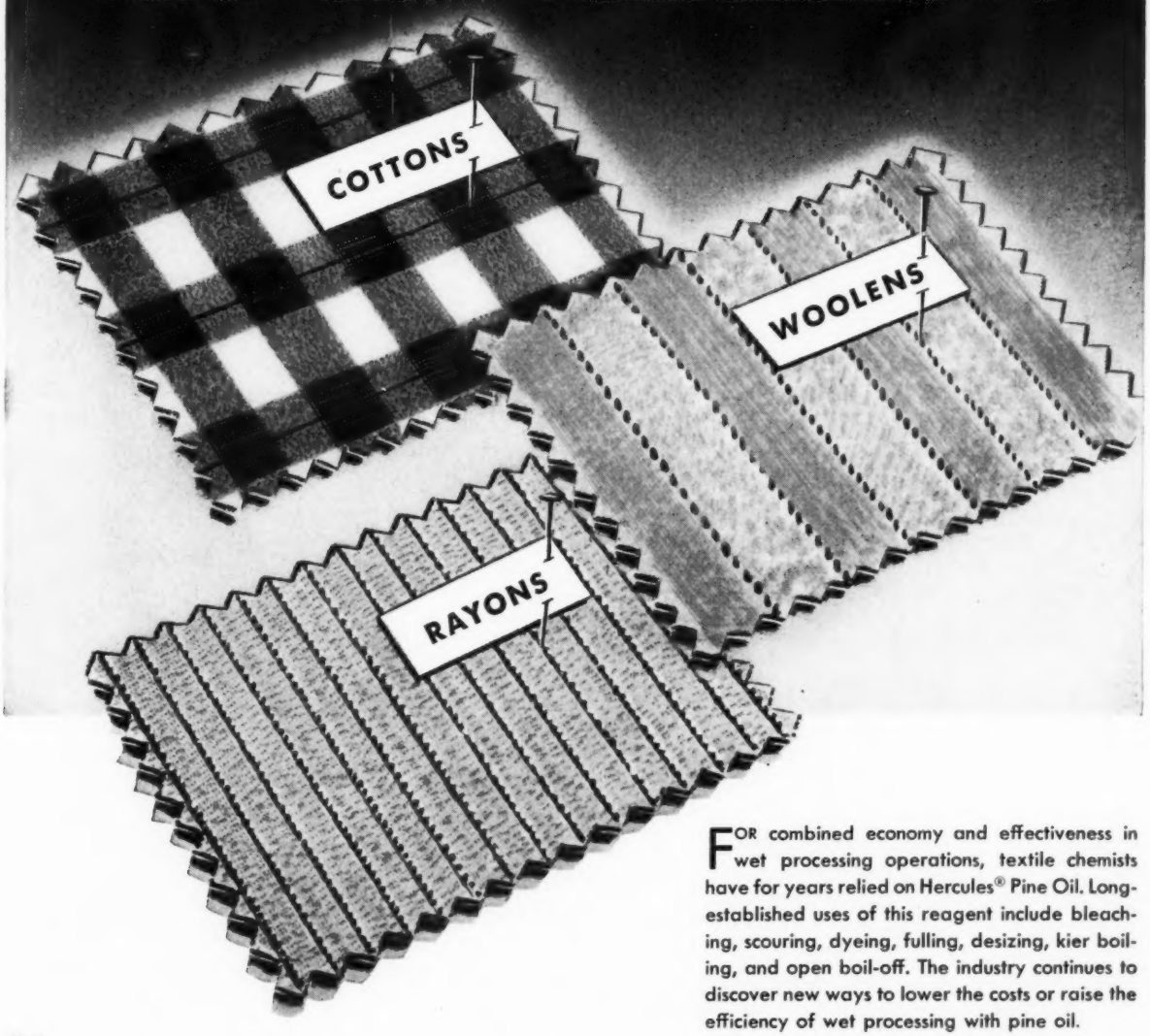
—the low-cost, time-tested reagent FOR WET PROCESSING



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The pictures shown here join with our headline to emphasize this message we would leave with you: *Whatever the uncertainties ahead, you can do no better than call upon the experience, skills and facilities accumulated by Nopco*.*

One of the oldest and most reputable suppliers of processing chemicals, we are prepared to supply you with outstanding Nopco FUA, an extremely versatile and efficient wool oil; Nopco 1656-R, the *one* worsted lubricant that eliminates static; nylon coning oils, dyeing penetrants; synthetic detergents and wetting agents; silk and rayon throwing oils; and the many other textile products for which we are famous.

As you go to work today in the interests of national defense, remember, too, that we are ready to make recommendations and supplement laboratory data with technical aid right in your mill. It will remain our fixed policy to serve you to the best of our ability, *come what may.*

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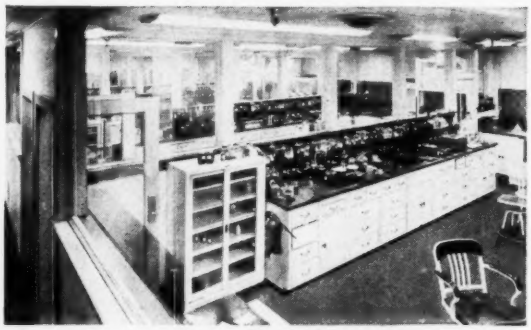
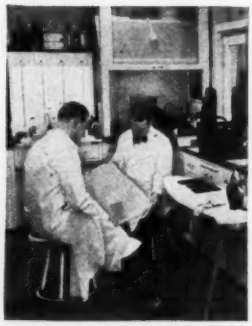
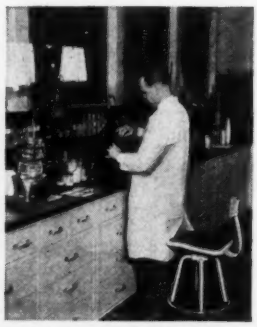


New Nopco Research Laboratories



Evaluating the effectiveness of warp and filling size formulated to give specific weaving results.



Preparing a sample of processing oil preparatory to running exacting laboratory tests.

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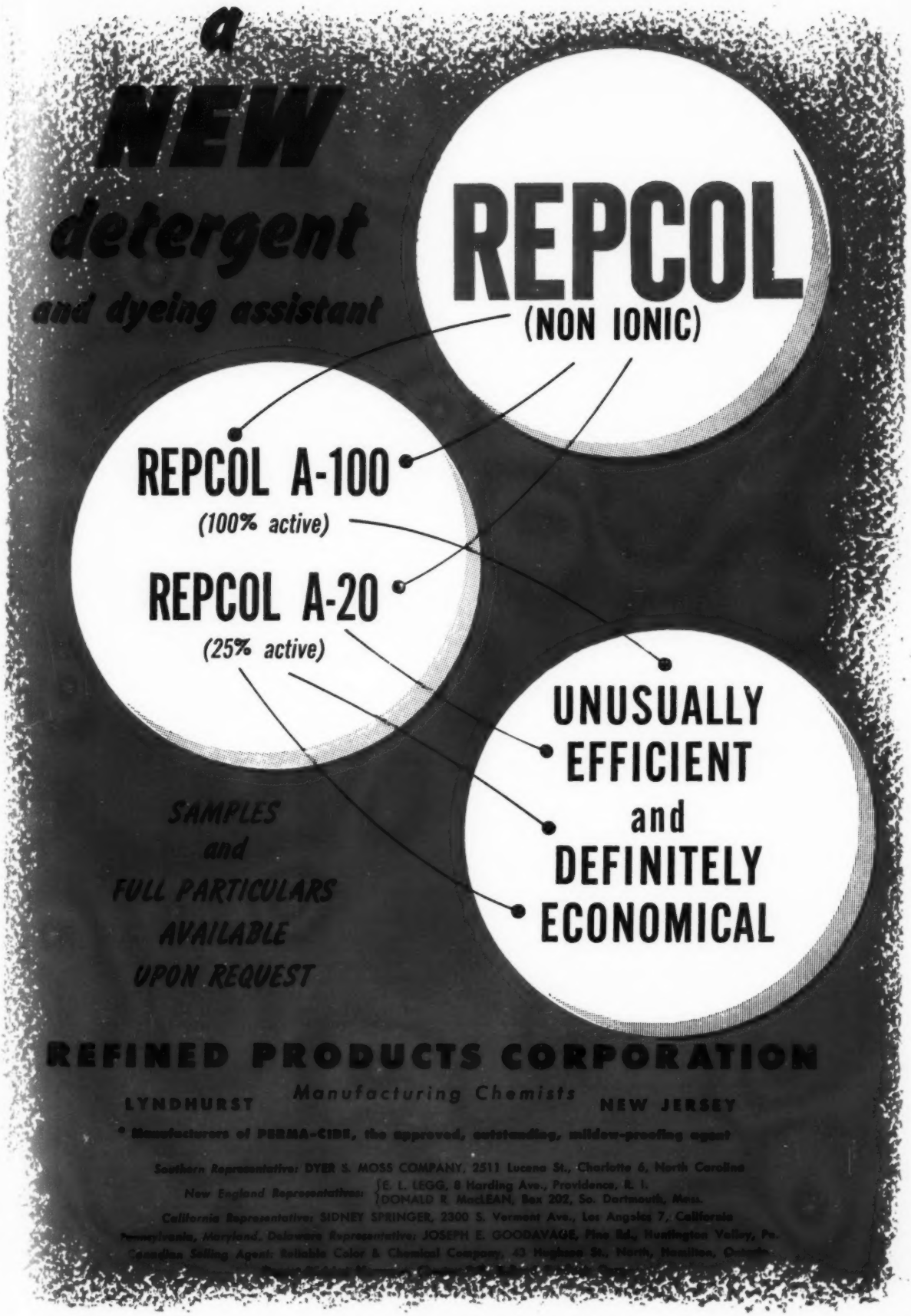
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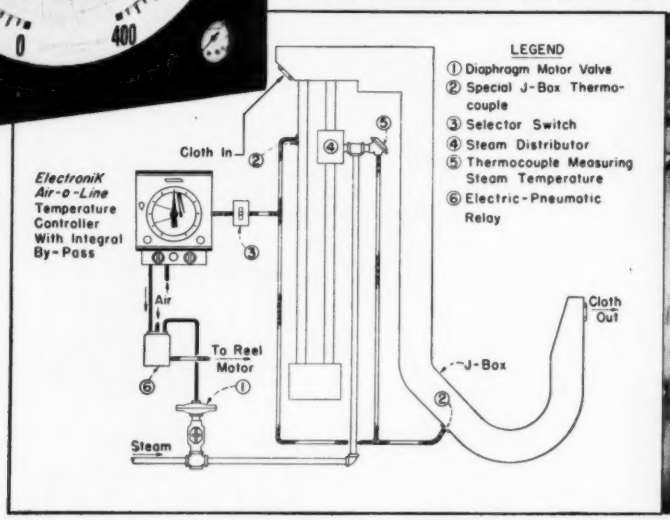

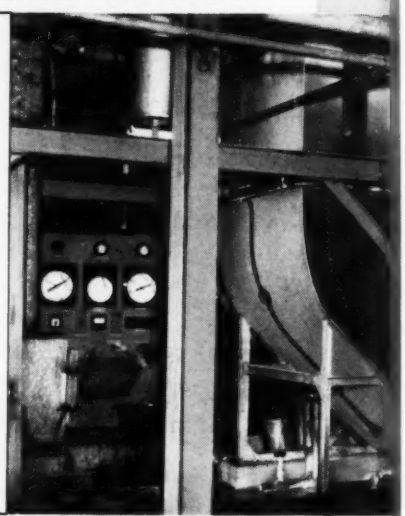

Bleach Range Panel at Joseph Bancroft and Sons Co., Inc., Wilmington, Del. ▲

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Developed specifically for these mills, it is preferred by them for its superior working properties... Infinitely better than old-fashioned bluing methods for obtaining the whitest whites on cottons and viscose rayons, Tinopal* BVA is excellent when used with dyestuffs in rendering brighter pastel shades as well... Pre-treatment or after-treatment with Tinopal BVA gives better contrast in direct prints on white ground...Very good fastness to water and washing...Tinopal BVA is used wherever the best quality in white goods is required.

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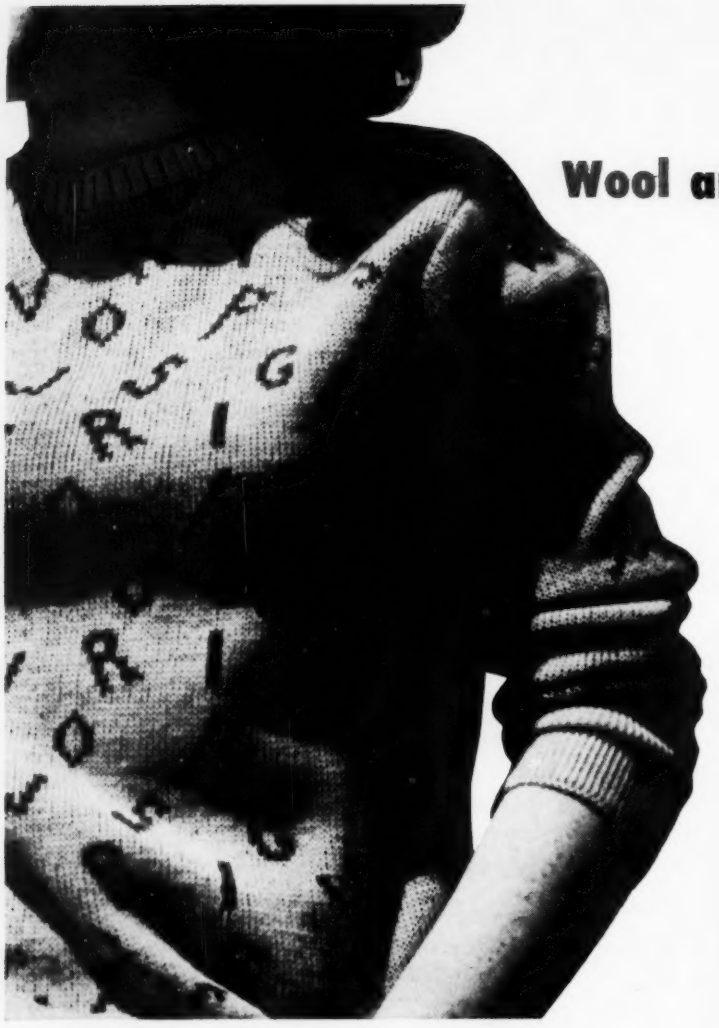

Wool and the ULTRAWETS

From raw wool to finished sweater . . . much of the processing involved can be improved by using the ULTRAWETS—a family of alkyl aryl sulfonates tailor-made for particular jobs. For example:

IN CARBONIZING RAW WOOL: The problem of finding an economical low foaming wetting agent which is stable to acid to facilitate the removal of the cellulosic impurities from the raw wool is solved by using liquid ULTRAWET 30DS.

IN SCOURING RAW WOOL, YARN, AND PIECE-GOODS: Liquid ULTRAWET 35KX is the most economical alkyl aryl sulfonate for volume use. Flake ULTRAWET K or bead ULTRAWET SK where dried products are desired.

IN DYEING: The liquids ULTRAWET 30E and ULTRAWET 30DS are particularly efficient as dye leveling agents.

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GOTHAM INSTRUMENTS

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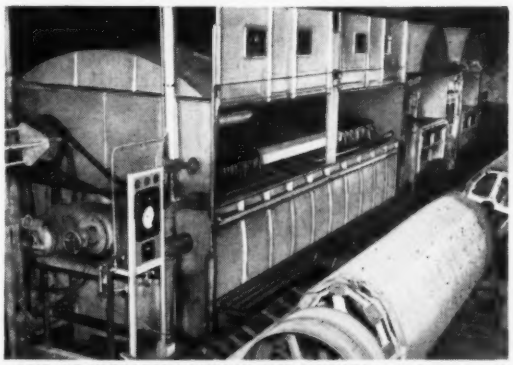
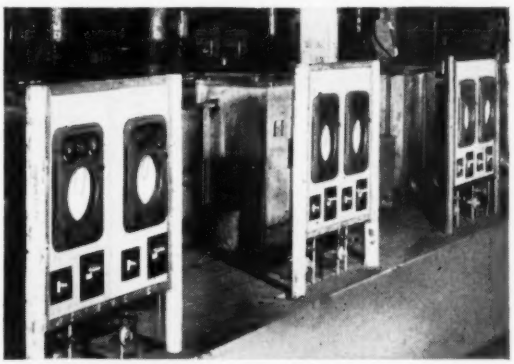
60 Gotham PC's at Botany

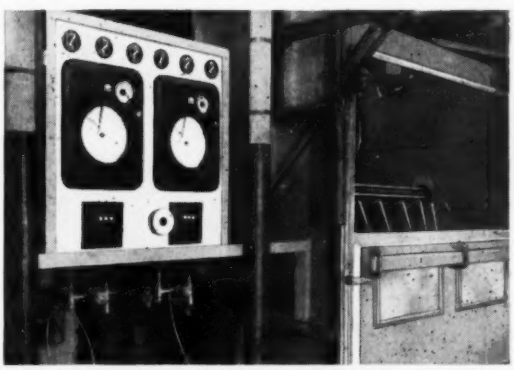
Over 60 Gotham Program Controllers are in use by famous Botany Mills, Inc., Passaic, N. J.



ONE OF WORLD'S LARGEST DYE KETTLES is at Botany and its dyeing cycle is supervised by Gotham Program Controller. Program control helps to maintain uniformity of the color.



12 TOP DYE KETTLE program controller units by Gotham are installed at Botany. Program control enables Botany to adjust quickly the variable time cycles required to get level dyeing.



EACH OF 48 DYE KETTLES like this at Botany, used for piece goods, is individually handled by its own Gotham Program Controller.

Photos: courtesy of Botany Mills, Inc.

GOTHAM INSTRUMENTS
Division of American Machine and Metals, Inc.
Dept. 4, 233 Broadway, New York 12, N. Y.

Please send me a copy of your latest catalog and more information about Gotham ☐ Program Controllers ☐ Timers ☐ Recorders ☐ Have your man call. No obligation, of course.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

HOW LIXATE BRINE CUTS DYEING COSTS

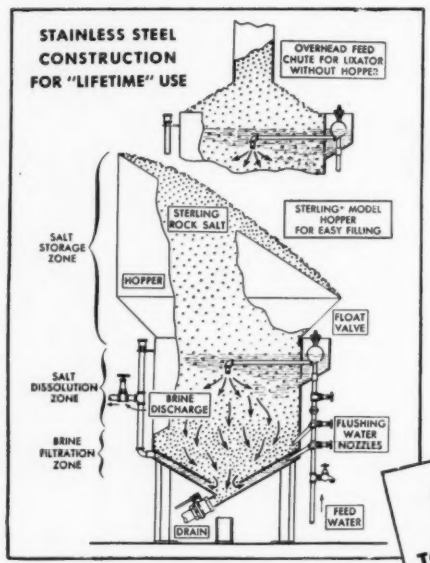
MORE UNIFORM DYEING: More and more plant managers are learning how to get better dyeing results, yet cut operating costs, by using Lixate brine. The use of saturated Lixate brine in the dye bath, instead of dry salt, improves the quality of finished goods by helping to eliminate spots, streaks and white edges. When dry salt is added, it tends to create areas of concentrated brine around the grains of salt. These concentrated areas drive excessive quantities of dye into fabrics, causing spots and streaks. Lixate brine helps overcome this difficulty because it disperses instantly and evenly through the bath, producing a smooth exhaustion of the dye.

CUTS SALT CONSUMPTION: Many mills report that they use approximately 12% less salt when Lixate brine is used in the dye bath. This is because saturated brine is more efficient as an exhausting agent. One gallon of saturated brine contains 2.65 pounds of salt. But when used as the exhausting agent, one gallon of saturated brine appears to be equivalent to three pounds of dry salt. This is the figure used for best dyeing results by actual experience.

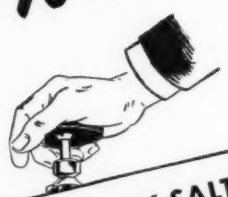
CUTS OPERATING COSTS: Results at mills that have changed from dry salt to Lixate brine indicate that brine increases plant efficiency and reduces operating costs. The brine method not only helps eliminate redyeing, but also cuts down on unnecessary salt handling because brine is made automatically and piped throughout the plant.

HOW IT WORKS: An engineering development of the International Salt Company, Inc., Scranton, Pennsylvania, the Lixator consists of a rock salt storage hopper over a dissolving tank with a brine collection chamber. Rock salt flows by gravity into the tank at the same rate it is dissolved, automatically replenishing the supply. Water enters near the top. As water flows downward, it dissolves the rock salt, until it becomes fully saturated some distance from the bottom of the tank. From that point on the remaining rock salt acts as a filter bed that removes all insoluble matter from the brine. As a result, when it reaches the collection chamber, the brine is crystal clear and fully saturated. Lixate brine is always crystal clear and neutral — free from acids and alkalies — and for that reason is also used to regenerate zeolite water softeners. The same Lixator provides saturated brine for this purpose and for use in the dye vats. Lixators may be made in any size to meet individual plant requirements.

SALT! WHY HAUL IT? MEASURE IT? STIR IT?



Just Turn It On!



STERLING ROCK SALT BRINE DELIVERED BY PIPE TO EVERY POINT IN YOUR PLANT
- DYEING MACHINES
- DYEING VATS
- ZEOLITE WATER SOFTENERS

HOW LIXATOR WORKS

In the dissolution zone — flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the filtration zone** — through use of the **self-filtration** principle **originated by International,** the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

WHAT THE LIXATOR PROVIDES

- ✓ **Chemical and bacterial purity to meet the most exacting standards for brine.**
- ✓ **Unvarying salt content of 2.65 pounds per gallon of brine.**
- ✓ **Crystal-clear brine.**
- ✓ **Continuous supply of brine.**
- ✓ **Automatic salt and water feed to Lixator.**
- ✓ **Inexpensive, rapid distribution of brine to points of use by pump and piping.**

Savings up to 20% and often more in the cost and handling of salt have been reported by many Lixate users. Why not investigate?

• You can eliminate shoveling, hauling, and laborious hand stirring of salt and water, and frequent testing of the brine strength — with International's Lixate Process for Making Brine. Stops waste through spilling. Saves time and labor. Assures accurate salt measurement.

• The Lixator *automatically* produces 100% saturated, free flowing, crystal-clear brine — which may be piped to as many points in your plant as you desire — any distance away — by either gravity or pump. YOU SIMPLY TURN A VALVE for self-filtered, LIXATE Brine that meets the most exacting chemical and bacterial standards.

An INTERNATIONAL Exclusive

The LIXATE* *Process*

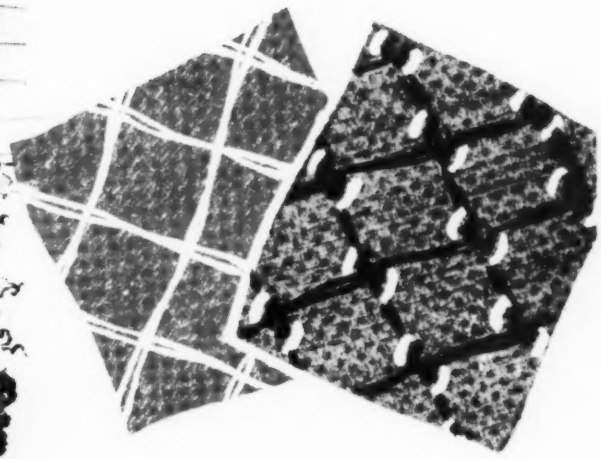
FOR MAKING BRINE

*REG. U. S. PAT. OFF.

INTERNATIONAL SALT COMPANY, INC., Scranton, Pa.

A TIP ON TABLECLOTHS

use **Keltex** *...modern print paste thickener...*



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IN CANADA: SCHOLLER BROTHERS, LTD., ST. CATHARINES, ONTARIO

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Port Carbon, Pa.

Installed.....July, 1948
Capacity.....3,000 lbs./hr.
Goods Processed.....Cotton ribbed knit material and flat knit of all sizes and weights

Processing time cut to less than 2 hours . . . Substantial savings in steam, water, and chemicals.

SPRING CITY
Bleach and Dye Works
Spring City, Pa.

Installed.....July, 1947
Capacity.....3,000 lbs. per hr.
Goods Processed.....Cotton knit

Bleaching time reduced 90% on light- and medium-weight fabrics . . . All operations easily handled by two men.

LUMBERTON
Bleach and Dye Works
Lumberton, N. C.

Installed.....March, 1948
Capacity.....2,500 lbs. per hr.
Goods Processed.....Cotton knit underwear fabrics

Results satisfactory in every respect . . . Millions of yards processed speedily and economically since installation.

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E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department, Wilmington 98, Del.

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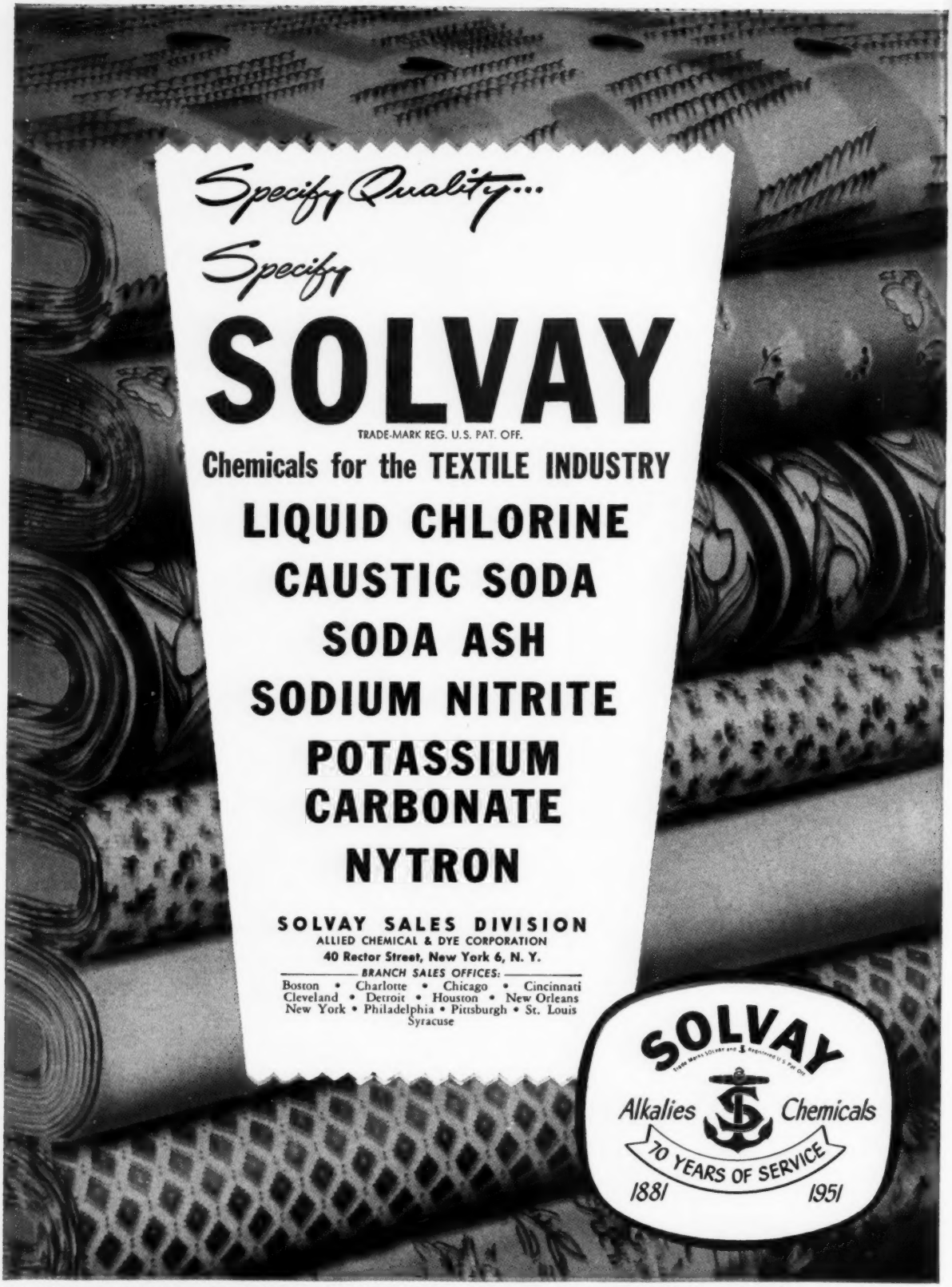

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April 16,

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Processing is too complex to be adequately served by a conventional product. That's why modern dyers and chemists rely upon a chemical specialty developed by Dexter for their specific operations.

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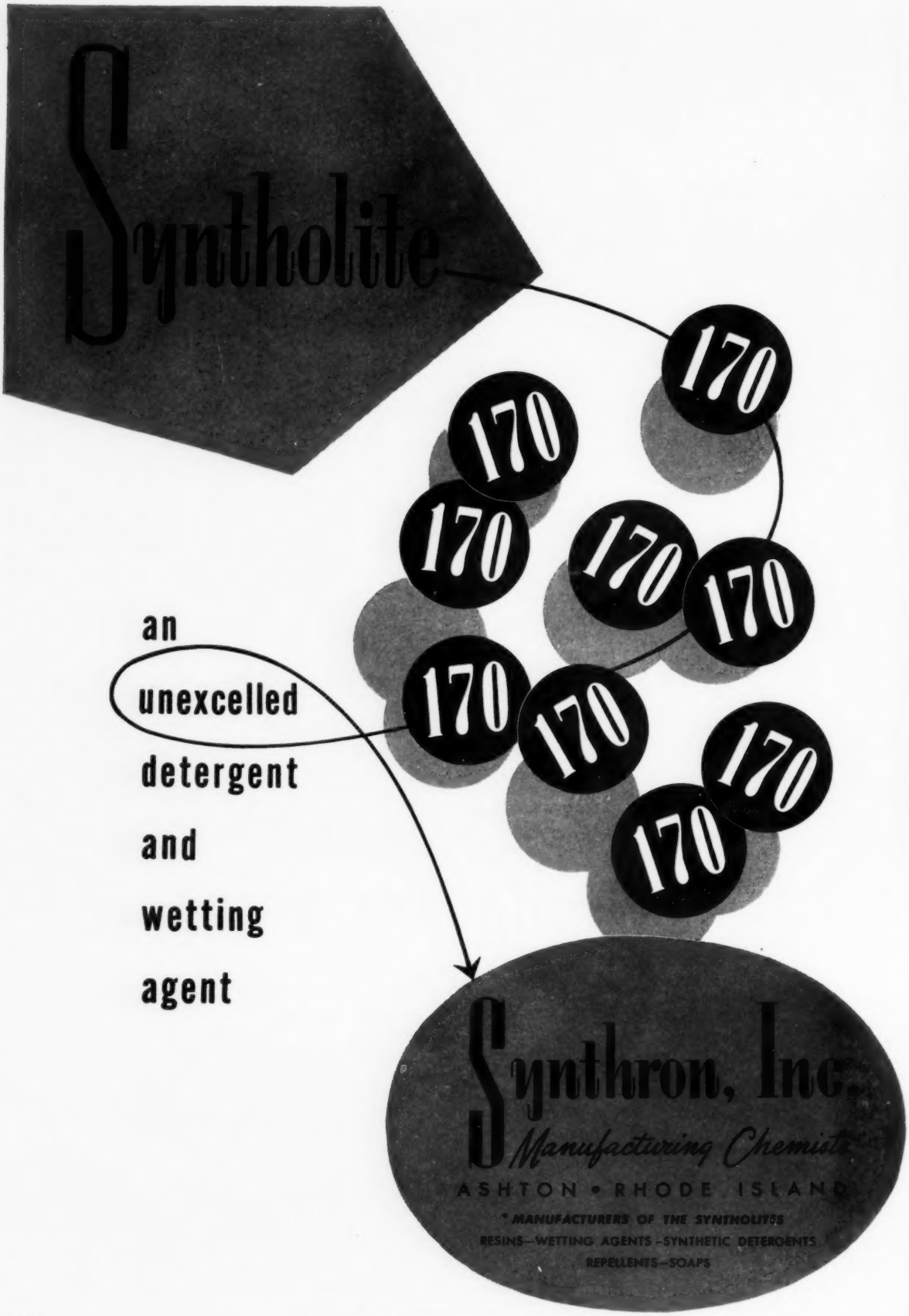
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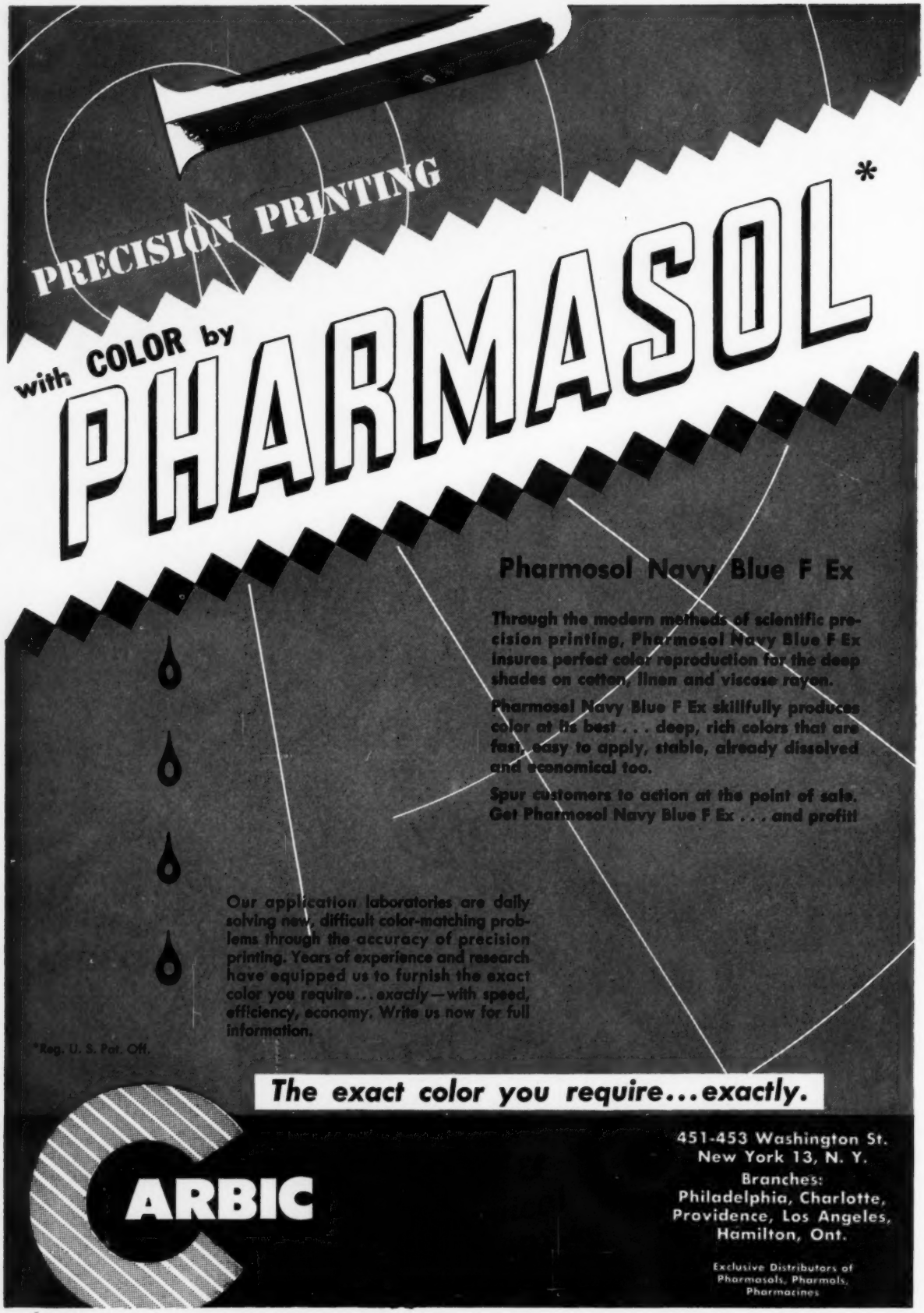
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Knitting Arts Exhibition Number

AMERICAN

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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists.

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday by the **HOWES PUBLISHING COMPANY, INC., 44 E. 23rd Street, New York 10, N. Y. C. R. Howes,** President; **Harry F. Crawford,** Executive Vice-President; **Norman A. Johnson, Myron D. Reeser,** Vice-Presidents; **Ernest J. Finan,** Treasurer; **C. Essenbreis,** Secretary.

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APRIL 16, 1951
VOLUME 40 NUMBER 8

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DYESTUFF REPORTER

VOLUME 40 APRIL 16, 1951 NUMBER 8

THE 40TH KNITTING ARTS EXHIBITION

Atlantic City Auditorium

April 30-May 4

OVER 200 exhibitors have contracted space for the 40th Knitting Arts Exhibition to be held April 30th to May 4th at the spacious Atlantic City (N J) Auditorium under the auspices of the National Association of Hosiery Manufacturers.

Reports indicate that a majority of the industry's leading manufacturers of knitting, dyeing and drying machinery, mill supplies and allied products will be on hand. New machines, processes and finished products will be featured along with standard models and methods of long standing—all of vital interest to the knitting trades.

Tickets may be secured from exhibitors or from the exhibition management headed by Albert C Rau, Manager. Mr Rau's offices are at 332 Park Square Building, Boston, Massachusetts.

The AMERICAN DYESTUFF REPORTER will be located in booths 120-121 and the staff extends a most cordial invitation to visit, to discuss aspects and problems of the wet-processing industry, or merely to relax after a lengthy tour of exhibits.

Descriptions follow of the exhibits, which it is felt, will be of chief interest to our readers. Immediately following the descriptions is a comprehensive list of other exhibitors with corresponding booth numbers.

Air-Perme-Ator Manufacturing Company

300 Preakness Avenue, Paterson 2, N J

Booths 119-B C D

The Air-Perme-Ator system will be demonstrated with a stainless steel model showing the basic features of molecular suspension. On display will be the Model B-5 Humidifying Heating and cooling unit, with capacity up to 100,000 cubic feet per unit, as well as a conditioning cabinet showing possible variation between temperature and humidity.

In attendance: John Kohut, Sr, H E Kresse, Edward Kohut, Richard G Burr.

Amalgamated Chemical Corp

Rorer and Ontario Streets, Philadelphia 34, Pa

Booth 382

This display will contain various products manufactured by Amalgamated for textile processing.

In attendance: Harold B Dohner, president; Robert A Bruce, vice president and treasurer; John M Jester, secretary; Hillary Robinette, Jr, research director; Charles E Seel and George C Harkins, technicians.

American Aniline & Extract Company, Inc

Venango & F Sts, Philadelphia 34, Pa

Booth 212

Murals depicting manufacture of PM-90 Size and Orthocryl, Ortholube STS and other processing specialties.

In attendance: Wm J Duddy, president; R D McCarthy, vice president; M H Silberman, technical director; Lynn Kippax, sales representative.

American Safety Table Company, Inc

Reading, Pa

Booths 378, 379, 404 and 405

The Amco Individual Motor and Stand, the Amco Group Drive Tabling and the recently developed Amco Knit Goods Pressing and Conveying Unit will be on display. Emphasis will be placed on the totally enclosed motor and pre-lubricated, permanently sealed ball bearings of the Amco Individual Motor. The Amco Knit Goods Pressing and Conveying Unit is used on cotton t-shirts, jockey shorts, athletic shirts, etc.

In attendance: David Frankel, executive vice-president; Julian C Frankel, sales director; Ben Greenawalt, sales representative; Sam Wolf, chief engineer.

Amplex Manufacturing Company

(Subsidiary of Chrysler Corporation)

Detroit 31, Michigan

Booths 120AA & 121AA

On display will be a broad selection of Oilite metal powder products (both ferrous and nonferrous) used in the textile industry including permanent metallic filters, frictional units, and bar and plate stock. Built-in oil reservoirs in Oilite bearings and machine parts are said to provide a dripless, constant and continuous film of lubricant. The units also employ oil cushions for smooth, quiet operation without binding or scoring.

Special features to be emphasized will include bolster bearings, spindle brake levers, sprockets, compound gears, saddles and cap bars. Two new type bolster bearings have been developed by the company over the past year and will be on display.

In attendance: personnel of Beemer Engineering Company of Philadelphia, Oilite representatives for the Middle Atlantic

States including: Frank Beemer, president; A J Diesinger, Jr, vice president; H G Silcox, III, sales manager; D A Talbot, J E Blizzard, D R Blair, sales engineers.

Bausch & Lomb Optical Company

635 St Paul Street, Rochester 4, N Y

Booth 416

The Ortho-Rater, a precision optical instrument for measurement of individual characteristics of vision, will be demonstrated along with B & L magnifiers and Stereoscopic Microscopes.

In attendance: R Craytor, sales manager of the Occupation Vision Department; G Houseworth and R H Cook.

College Pharmacy Products

16 Brooks Park, Medford 55, Mass

Booth 79

Clena-form, a cleaning agent for removing dyes, dye color and resins from metal while hot, will be featured. On cold metal the product acts as a lubricant. It is reported to be noninflammable and nonvolatile. Clena-form's use on boarder and preboarder forms will be pointed out.

In attendance: B Zarakov, president; J Zarakov.

Commonwealth Color & Chemical Company

3240 Grace Avenue, New York 67, N Y

Booth 523

Commonwealth will feature a complete line of chemical specialties in general use for wet processing of knit goods. In addition they will emphasize the technical service offered by their Hosiery and Underwear Laboratory to the knit goods trade, and will display new products such as Orosist and Veedex, dyeing assistants for Orlon, Fiber V (Dacron) and dynel, as well as new developments in nonresin hosiery finishes (the new Nilaton series).

Cutting Room Appliances Corp

45 West 25th Street, New York 10, N Y

Booths 99 to 102

The following CRA items will be on display: Electrical Knit Goods Laying Up Machine for tubular knit fabrics, Electromatic Cloth Spreader, Automatic Cloth Spreader, Clip-matic Thread Trimmer, Measuring and Inspecting Machine, and Metal Sectional Cutting Table.

In attendance: David Grossberg, sales manager; Harold Liebman; John E Fox, Southern representative; Harrison Bard, advertising manager; Bert Gottschalk, engineer.

C R Daniels, Inc

Baltimore 16, Maryland

Booth 281

Products exhibited will include aluminum frame hosiery trays, canvas baskets, hampers and trucks, and canvas bags in hosiery mills.

In attendance: William E Carson, Jay S Connelly.

W F Fancourt Co

516 S Delaware Ave, Philadelphia 47, Pa

Booths 371 & 372

The general type of product to be shown will be fabrics and hosiery treated with various finishing materials manufactured by W F Fancourt and also a complete line of latest developments (e g, transfer remover, various softening agents, waterproofing compounds).

A special feature to be emphasized is the company's new hosiery finish, a combination containing type 8 nylon which is said to produce an entirely new dulling effect and impart a most unusual hand and feel. It is stated that this new finish greatly reduces snags and pull threads in the finishing operation.

Items to be displayed will include various denier nylon hosiery, nylon knit and woven fabric which have been treated with the new finishing formula. In addition there will be waterproofing compounds to be used with mildewproofing and fireproofing agents to meet government specifications.

In attendance: W F Fancourt, Jr, W F Fancourt III, John L Fancourt, Howard A Virkler, Thomas Lindley, Claude Wolff.

Fletcher Works

Philadelphia, Pa

Booths 428-29-30

Latest company developments in throwing machinery and centrifugal extractors. The following units will be featured: Double Deck Pirn Twister, Double Deck Headless Package Twister, and a modern 40-inch "Whirlwind" Open Top Extractor with stainless steel basket and automatic hydraulic brake and timer.

In attendance: Fletcher Schaum, president; W H Rometsch, secretary-treasurer; C W Moore, vice president in charge of sales; W W Egee, chief engineer; T B Baldridge, Jr, T M Jackson, Jr, sales engineers; F W Warrington, George Dudley, D P Underhill, Carl Harris, sales representatives.

Foster Machine Company

Westfield, Massachusetts

Booths 28, 29, 30, 35, 36 & 37

Among other displays, the winding of dye packages of synthetic yarn on the Model 75 should be of interest.

In attendance: E C Connor, sales manager; H E Swift, H A Cadle, E H Ely, John Davenport, P H Farmer, E P Dodge, G W Mallory, sales department; H W Ball, chief engineer; F F Stange, E R Davis, engineering department.

General Electric Company

Schenectady 5, N Y

Booths 24, 25 & 26

Guests will be permitted to operate a G-E speed variator, and to control the speed of an a-c adjustable-speed motor by varying the position of motor brushes housed in a plastic case. Also guest-operated will be a screenless open textile motor in a lint-feed plastic case, and a G-E hysteresis yarn tension brake operating on a Foster winder.

Other portions of the exhibit will include a vertical yarn-twister motor, an electronic beam let-off control for tricot knitters, and Thy-mo-trol* drives for both circular-knit and full fashion hosiery machines.

In attendance: S C French, R A Winner, apparatus exhibit and display section; J W Holt and J J McCarthy, textile industries section.

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* Reg Trade-Mark for G-E's thyratron motor control.

H C Harding Inc

2nd Street, Philadelphia, Pa

Booth 403

New products will include 15-D Nylon Yarn Lubricant, the Humdinger Needle Polisher & Preserver, and the Trudine (3 in 1) Nylon Yarn Trough Solution. Also on display will be Stay Coat Stainless Needle Oil, Hosiery Form Cleaners, and Check #9 Solvent and Penetrant.

In attendance: H C Harding, Geo J Reihl.

Philip V Hugues & Sons

4626-32 Baltimore Avenue, Philadelphia 43, Pa

Booths 43 & 44

This exhibit will feature portable vacuum cleaners ranging in sizes from ½ to 5 HP for either dry or liquid pick-up. Floor maintenance machines for wet or dry scrubbing, polishing, waxing, steel wooling, and sanding, ranging in size from 9" to 21" will also be featured. Emphasis will be placed on portable vacuum cleaners powerful enough to be used with up to 100 feet of hose. These are designed to handle any dry or liquid material without changeover or alteration in the machines. The manufacturer states that they are portable enough to be handled by a single operator.

In attendance: Philip T Hugues, Joseph W Hugues, Paul R Young, Samuel C Ruch, C E Clifford.

Indianapolis Chemical Co, Inc

Davidson and Michigan Streets, Indianapolis, Ind

Booth 198

B-1 Nylon Cleaning Solution and B-1X Nylon Trough Solution will be displayed.

In attendance: R E McMillan, manager; J L Thibodeau, sales representative; H T Smolenski, chemist.

The Industrial Dryer Corp

432 Fairfield Ave, Stamford, Conn

Booths 73 & 74

The "H-W" Conditioner for nylon hosiery will be the chief attraction. This fully automatic unit is used to condition 15 denier full fashioned stockings immediately after knitting. Made either for steam or electric operation.

In attendance: P H Friend, J R Tutt, F W Caesar, W H Truesdale II and Canadian representatives (W J Westaway Company, Ltd).

Johnson Service Company

507 East Michigan Street, Milwaukee 2, Wisc

Booths 184 & 197

Automatic temperature and humidity control apparatus in actual operation, including room type, duct type and remote bulb thermostats and humidostats, together with valves for various services. Johnson "Record-O-Stats" (recorder-controllers) will be featured together with Aspirating Cabinets for thermostats and humidostats.

In attendance: M M Herrick, manager of publications and displays; branch office representatives.

C P Kaler Company

100 E 7th Street, Lansdale, Pa

Booth 89E

Kaler will feature Orlon, cotton and rayon dye nets; "Nopuls" wraps; bags for storage and carton liners.

In attendance: Clifford P Kaler, president; Paul Kaler.

Kali Manufacturing Company

427 Moyer Street, Philadelphia 25, Pa

Booth 69

The Kali exhibit will feature:

Kalpinols—trough solutions for the knitting of nylon.

K N K (Kali Needle Kleaner)—for cleaning needles, sinkers, etc on full fashioned machines.

Aquakal #77 and Nylowash—for scouring and dyeing nylon hosiery.

Unilev—for the level dyeing of unions on 15 denier hosiery.

Kali Chlorine Neutralizer— for neutralizing chlorine in bleached fabrics.

Hydroxy Hand Cream—for operator's use in handling nylon.

Other products—oils, specialties for throwing, penetrants for dyeing and water repellents.

In attendance: S G Davenport, president; J A Branegan, Jr, vice president; Wm B Griffin, Southern sales representative; John Gilroy, Raymond Schadewald.

Kearny Manufacturing Co, Inc

681 Schuyler Avenue, Kearny, New Jersey

Booths 177, 178, 203 & 204

The Surco System of yarn conditioning on winders will be emphasized along with the Midget Textile Psychrometer. Textile conditioning machinery and chemicals, textile finishing chemicals and a moisture tester will round out the exhibit.

In attendance: C F Dulken, president; W O Schlimbach, sales manager; R H Sommer, export manager; Dr Karl Heyman, chief chemist; C F Egues, sales; P. Reuter, H Sonntag, engineers; G Westwater, C F Jones, representatives.

Laurel Soap Manufacuring Company, Inc

Tioga, Thompson & Almond Streets,

Philadelphia 34, Pa

Booths 228 & 229

The Laurel line of soaps, oils and finishes for the knitting trade will be exhibited.

In attendance: Clarence E Bertolet, president; Wm H Bertolet, Jr, treasurer; A Henry Gaede, Wm H Bertolet, III, Thomas C Holst, Albert H Rant, Robert P Rhodes.

Leatex Chemical Company

2722 N Hancock Street, Philadelphia 33, Pa

Booths 506 & 507

Leatex will exhibit industrial chemicals.

In attendance: John McChesney, Jr, William Brink, Harry Buckley, Charles Hammell, Maurice M Guertin, John F Rieder, Herbert Higginbotham, Joseph A Clark, John McChesney, Sr.

David Maiman & Company

633-35-37 Arch Street, Philadelphia 6, Pa

Booth 353

A general line of equipment will be exhibited for the cutting, pressing and stitching rooms of knitting mills, including cutting tables, thread trimming machines, canvas hampers and baskets, chairs, pressing irons, scissors and shears, pressure sensitive tape dispensers for packing rooms, and packing tables for hosiery mills.

New products on display will be the Suredry boiler and generator and the speed trim thread cutter. Special features of the display will be the cutting and packing tables and automatic thread trimmers.

In attendance: Aaron M Maimin, partner and general manager.

The Miller Company

99 Center Street, Meriden, Conn

Booths 112A & 112B

Fluorescent and incandescent lighting systems.

In attendance: G W Beals, chief illuminating engineer; L M Grawemeyer, A Phillips, L A Kline, C Maddox, A N Martinson, E S Coe, field sales engineers.

Onyx Oil & Chemical Company

190 Warren Street, Jersey City 2, N J

Booths 210 & 211

Onyx will feature their Eternalure Hosiery Finishes and other chemical specialties, which they recommend for processing ladies hosiery, men's hosiery and other knitted fabrics.

In attendance: Leon P Brick, Albert R Jenny, A C Mackey, Emil W Peters, R Allen Watson and J Walter Huber.

Paramount Textile Machinery Co

131 S Wabash Avenue, Chicago 3, Illinois

Booths 284, 285, 301, 302, 303 & 304

The following hosiery finishing equipment will be shown: Universal Presetter, Air-cooled Table, Stainless Steel Hosiery Forms, Aluminum Hosiery Forms, Duomold 34 Retort, and Paramark Transfer Machine.

A special feature of the display will be a women's nylon hosiery finishing process, to be emphasized with the slogan "Paramize with Paramount."

In attendance: Henry Pope, Jr, president; William P Pope, vice-president; J C Fenley, sales manager; W H Albertson, O A Siegel, L D Ross, W E Pike, L J Albertson, sales representatives; M Gustafson, H Richter, H Campbell, G Dunn.

Joseph Pernick Company, Inc

54-19 Flushing Avenue, Maspeth, N Y

Booth 199

A knit goods finishing machine and a knit goods measuring and examining machine will be featured.

In attendance: Louis Pernick, president; David Pernick, treasurer; David Haft, secretary.

Philadelphia Metal Drying Form Company, Inc

4550 Torresdale Ave, Philadelphia 24, Pa

Booths 103, 104 & 105

A complete line of hosiery drying forms and attachments will be shown, the forms to be both steam and electrically heated types. Particular emphasis will be placed on a multi-shaped attachment, which converts Komet or Crew base forms into cushion sole style. Emphasis will also be placed on the Hi-Temp intensifier manifold featuring direct circulation of steam through forms and elimination of cold forms. Accessory equipment will include steam and electrically heated tables, tissue inserters, and envelope fillers.

In attendance: Joseph Seligman, president; Harry F Stern, II, vice president and secretary; Thomas A Temple, vice president and treasurer.

Proctor & Schwartz, Inc

Philadelphia, Pa

Booths 186 to 195

In addition to a feature display of three pieces of Proctor equipment for hosiery manufacturers, part of this exhibit will be devoted to the interests of manufacturers of knit goods. A film "Redmanized Fabrics" will be shown in the booth and will highlight the system developed by Frank Redman and Proctor & Schwartz for controlling shrinkage in tubular knit goods.

The three machines to be featured:

(1) A compact, simplified, single operator, Automatic Boarding, Drying, Stripping, Piling and Counting Machine for Women's Hosiery — considerably more compact than previous Proctor equipment. For the duration of the exhibit this unit will be in complete operation, actually finishing hosiery for a well known manufacturer.

(2) Proctor Automatic Boarding Machine—can be used with equal efficiency for preboarding or processing dyed nylon hosiery.

(3) Proctor Nylo-Set Cabinet—designed for presetting sheerest nylon hosiery prior to looping and seaming. (Presetting sets up a protective resistance to rough handling and storage and consequent damage.) The company states that results with hosiery processed in this system show a 50 per cent reduction of pull threads and scratchouts, a 20 per cent increase in production in the seaming department, and a 15 per cent increase in output of first quality work.

In attendance: Proctor representatives familiar with the production of Redmanized fabrics will be in attendance to discuss specific test results and show how this system may be used to produce cotton tubular knit goods, woolen tubular knits and combination cotton and woolen tubular knits to meet government specifications. Charles S Tiers (manager, Hosiery Division), B A Plesser, W J Merrigan, W H Poole and W A Dickinson, Jr will be at the booths all week.

Those who will be on hand part-time include: Myron T Fleming, C W Schwartz, IV, T A Wentz, Craig Schoeller, L Buck, H G Black, Pierre Blommers and John W. Reinhardt.

Reading Testing Laboratories

245 Poplar Street, Reading, Pa

Booth 528

The Reading Testing Laboratories "Labricator" will be introduced, an attachment containing a conditioning chemical agent for perfect stitch formation. The product is reported to eliminate troughs, wicks, trough solutions and wick oils.

Also exhibited will be the "Labisol" and "Retesol" needle cleaners, conditioners (formulas "A," "B," and "C"), and a trough solution.

In attendance: Dr Jay H Quinn, director of research; John W Auman, assistant director of research; Robert Gantner, technical representative; Edward E Davis, sales representative; Mary Ann Pappas, office manager.

The Reliance Electric & Engineering Company

1068-1088 Ivanhoe Road, Cleveland 10, Ohio

Booths 410 & 411

The newest and smaller version of the Reliance V*S Drive will be the featured unit in an operating display. Visitors will be offered the opportunity to operate the unit, an electrical transmission, which starts, stops, and reverses directly from A-C power supply. The V*S Drive in the larger h p ratings will also be displayed.

The line of Reliance Precision-Built Induction Motors in various enclosures will also be exhibited. Cut-away motor sections will reveal such features as Reli-X insulation, pre-lubricated bearing design, and indexing of motor leads.

In attendance: K S Lord, Philadelphia district manager; C D Herbert, New York district manager; E G Orahood, Atlanta district manager; E H Koontz, Newark branch manager; E E Helm, sales vice-president; P W Arnold, manager of production sales; K F Ertell, advertising manager; M M Hepler, textile service engineer; C E Robinson, textile application engineer; N R Smith, E H Sowers, F R Obenchain, F W Leitner, R L Custis, sales engineers.

Rex Hosiery Finishers, Inc

B Street, Philadelphia 34, Pa

Booth 375

The technical details, properties, and advertising methods of the new Rexonize Process for hosiery finishing will highlight this exhibit. The telephone number for this booth will be Atlantic City 5-6796.

In attendance: Sidney T Simon, president; Mary L Gilmore, vice-president in charge of production; Thomas Honold, superintendent of quality control; A V Gray, New York representative.

Richmond Oil, Soap & Chemical Company

1041-1043 Frankford Avenue, Philadelphia 25, Pa

Booth 118

Chemical specialties for knitting, dyeing and finishing all kinds of knitted wear with a special emphasis on materials for the knitting, dyeing and finishing of nylon hosiery.

New and unusual products will include Nylsperse — for better union between monofilament and multifilament nylon yarns, Dynyls for use with napthol colors, and Nyltex trough solutions.

In attendance: William Alkus, vice-president; Morton W Levi, John Schenkel, Henry M Rubin, William Kamarek.

S & M Dye Works, Inc

3419 Richmond Street, Philadelphia, Pa

Booth 520

Samples of yarn dyed by S & M, of S & M Glamour White, and of Kelpie (U S A) Ltd Shrinkproofing.

In attendance: James R Shoch, secretary; Lindsey H Mason, president; Malcolm M Anderson, treasurer; Thos O'Donnell, New York representative; James B Egee, chemical engineer.

San-Knit-Ary Textile Mills

5423 Lena Street, Philadelphia 44, Pa

Booth 112D

On display will be a complete range of dye nets for every purpose.

In attendance: Paul D Dalsimer, treasurer; Richard Reis, vice-president.

Scholler Brothers, Inc

Collins and Westmoreland Streets, Philadelphia 34, Pa

Booths 232, 233, 258, 259, 270 & 271

Soaps, softeners, oils and finishes for all fibers will be exhibited along with samples of fabrics treated with same. Features will include the Durabeau Finishes for hosiery and the "Schollerized" Wool Shrinkage Process. DuraBeau CL—a new synthetic resin finish—will also be on display.

In attendance: F C Scholler, president; E S Atkinson, J F Noble, L M Boyd, J O Sweitzer, C H Schuettler, Wm Jackson, Jr, A H Miller, salesmen.

Scott Testers, Inc

Providence, R I

Booth 352

Three machines applicable to current mobilization procedure will be exhibited; the Model J Tensile Tester, the Model X-5 Single-end Tester for yarn and thread, and the T-2 Complete Twist Counter.

The tensile tester will be equipped for zipper tape testing with A-1 clamps and the W Attachment to perform burst test in accordance with the QM Corps specification calling for mechanical burst test as acceptance test on underwear and other knitted fabric.

The single-end tester is equipped with Fletcher type clamps, which accommodate flat materials up to ½" wide, for tensile and elongation tests up to 20 lbs. This machine is motor driven, with standard speed of pull of 12" per minute (adaptable to 20"), and provides for instant return of the pulling clamp to the starting position.

In the T-2, both clamps may rotate so as to untwist a covering or component, or one clamp may be kept stationary as in the conventional twist counter. A plano-

cylinder magnifying glass permits detailed specimen examination. Reversing type driving motor may be added.

In attendance: Harold W Horton and David C Scott, Jr.

Smith, Drum & Company

432 West Allegheny Avenue, Philadelphia 33, Pa

Booths 52 to 61, incl

Package dyeing, extracting and drying equipment will be shown along with hosiery dyeing and finishing equipment and skein dyeing equipment.

In attendance: Harry S Drum, W C Dodson, A P March, J P G Patton, Robert N Smith.

Specialty Products Company

190 Warren Street, Jersey City 2, N J

Booth 525

Quality oils and chemicals of interest to the knitting arts will be on display.

In attendance: S J Singer, R Raas, P G Hendrix, S J Singer, Jr, H A Koller, J Axelrod, M Keller, E Yzewyn.

Sun Oil Company

1608 Walnut Street, Philadelphia 3, Pa

Booths 24A & 31A

This display will feature Sunotex Machine Oil Light, a new lubricant for needles, sinkers and supplementary parts of all kinds and makes of knitting machines. A "black light" apparatus will demonstrate the scourability of the product from all fabrics. A display of parts, bright after 200 hours in a humidity cabinet, will serve to show its rust-preventive characteristics. Other units will stress the product's ability to minimize wear and provide protection.

In attendance: M A Markley, general manager, Industrial Products Department; W C Taylor, export manager; E R Manning, B M Dunham, A L Anderson, technical representatives.

Synthane Corporation

Oaks, Pa

Booths 200, 201 & 202

Laminated plastics with applications to the textile industry.

In attendance: R R Titus, president; E E Smith, assistant sales manager; C B Moss, Southeastern district sales manager; J K Johnson, Philadelphia district manager; Herbert Widdop, sales manager; R B Galloway, F C Nave, sales representatives.

Tubular Textile Machinery Corp

33-61 54th St, Woodside, N Y

Booths 89C & 89D

Machinery will not be exhibited. However, large photographs and schematic drawings will be displayed of the following Tube-Tex machines: wet spread and extract; wet spread, extract and process; wet spread, extract, process and dry; steam and calender; tensionless folding calender; matching machine.

In attendance: Eugene Cohn, John Sasson, Don Foreman, Lee M Rothenberg, Jr, Daniel McEntire Gold.

Turbo Machine Company

Lansdale, Pennsylvania

Booths 154 to 159

Three machines will be exhibited, the finish boarder, the AD-48 and the crimper.

The Turbo Finish Boarder is a quick-dry for static-free stockings. Reported production—250 dozen pairs in 8 hours with two boarders.

The Turbo AD-48 is designed for preboarding, finish boarding or a combination of both. Circulating hot air keeps temperatures steady during boarding. Reported production—120-130 dozen pairs per 8-hour day.

The Turbo Crimper reportedly crimps nylon or other synthetics at 320 feet per minute.

In attendance: H W Matthews, B C Hall, W N De Turk, Francis Huguenin, Ward Bergey, Walter McCluen, Paul Wenhold, Ben Hammel, W K Wyatt, C H Smith.

Union Carbide & Carbon Corp

30 E 42nd St, New York 17, N Y

Booth 513

Dynel will be shown in its latest tricot, pile, and circular-knit applications. A simple schematic diagram will illustrate the production of dynel; dyed yarn skeins will show the wide range of colors available; and a list of dynel's properties will show sales advantages of the fiber.

U S Gutta Percha Paint Co

12 Dudley Street, Providence 1, R I

Booth 96C

An electric motion picture display featuring Barreled Sunlight Paint Products for maintenance of buildings and equipment. Color panel displays will also be shown as color suggestions for the painting of various interior surfaces of industrial plants and other company buildings.

In attendance: Howard F Eastwood, vice-president; Alex S West, Fred McCarthy, general sales managers; C L Park; Paul P Tuthill.

United States Testing Co, Inc

330 West 42nd St, New York 18, N Y

Booths 362 & 363

Testing equipment as may be of interest to the knitting trade will be featured.

In attendance: E H Winkleman, New York branch manager and E Donohoe, Philadelphia branch manager.

Venango Engineering Co, Inc

C and Lycoming Streets, Philadelphia 24, Pa

Booths 256, 257, 272 & 273

This exhibit will consist of textile dyeing equipment with particular emphasis on hosiery.

In attendance: C Harry McCandless, sales manager; A Robertson; E F Slaughter, J F Slaughter.

Walton Laboratories, Inc

1186 Grove Street, Irvington, N J

Booths 463, 464 & 465

Humidifiers, controls and indicators. Filtered Protected Model Humidifier will be one of the humidifiers featured.

In attendance: William Feldermann, president; John B Feldermann, advertising manager; J Robert Lewis, sales manager; B W Dickinson and Charles Bourgeois, sales representatives.

Waukesha Foundry Company

Lincoln Avenue, Waukesha, Wisc

Booths 181, 182 & 183

Regular products and features will include Waukesha Stainless Steel Castings; "Waukesha Metal" Nickel Alloy Castings in rough, polished and partly machined state; and a full line of Waukesha Positive Displacement Pumps.

In attendance: Emil M Howe, sales manager; Richard R Watt, Clyde Monda, Eastern representatives; Charles E Schick, Midwest representative.

Westinghouse Electric Corp

306 Fourth Avenue, Pittsburgh 30, Pa

Booths 260 to 264

Westinghouse will feature its type AV packaged adjustable-speed drive for full-fashioned hosiery machines. This new drive uses a selenium rectifier exciter, eliminating the need for either a belt-driven rotating exciter or an electronic exciter. Exciter maintenance is said to be minimized, since there are no moving parts and no vacuum tubes involved. The AV drive incorporates all-steel Life-Line construction and prelubricated antifriction bearings.

Also included in this display will be the following: type CSP Life-Line motors—open dripproof type, textile screened type, and rayon twister type; cutaway displays of the Life-Line and fractional horsepower motors; Life-Linestarters and Life-Line combination starters, featuring NEMA 1A lint-tight enclosures; lint-tight manual textile starter; type OT pushbutton station; class 10-023 Motor Sentinel; type AB De-ion circuit breakers; Micarta industrial laminate for textile application; industrial lighting for the textile industry; and a bus duct.

In attendance: C P Walker, textile application engineer.

Exhibitor	*Booth(s)*
Aberfoyle Manufacturing Company	325-326-339-340-350-351
Acrometal Products, Inc	532
Adelphia Textile Company	243
Ainslee Knitting Company	535
Allentown Bobbin Works	72
American Bemberg Corp	297-298-307-308
American Enka Corp	397-398-421-422
American Knitting Machine Co	122-123
American Lava Corp	119
American Schweiter Co	442-443-450-451
The American Thread Co	295-296-309-310
American Viscose Corp	327-328-337-338
American Vitex Co, Inc	77
American Wool & Cotton Reporter	76
American Yarn & Processing Co	457-458
Joseph Amon, Inc	70
Arrow Needle Co	407
Atlantic Rayon Corp	278-279-280
Backus Machine Works	14-15
Paul A Barker, Inc	500
Beemer Engineering Co	120A-121A
The Bentley Knitting Machine Organization, Inc	160 to 171, Inc
Boger & Crawford	291-292-313-314
H M Boshamer & Co, Inc	47-48
H Brinton Co	399-400-401-402-417-418-419-420
Cannon Mills, Inc	408-409
China Grove Cotton Mills Co	241-242
Comer-Avondale Mills, Inc	179-180
Charles Cooper Co, Inc	383
Cotton Yarns Co	222-222A
The Crawford Mfg Co, Inc	254-255
H E Crawford Mill Supply Co	514-515
Cross Cotton Mills Co	368-369
Daily News Record	62
Davison Publishing Co	11
Dixie Mercerizing Co	288-289-290-315-316-317
Dubied Machinery Co	521-522
The Duffy Silk Co	437-438-439
The Duplan Corp	249-250-251
E I du Pont de Nemours & Co, Inc	38-39-40-49-50-51
John A Eberly, Inc	266-267
Edmos Products Corp	110-115 Inc
Essex-Riplyn Co	524
Ewing Thomas Corp	248
Ernest A Feustal, Inc	67-68
Fidelity Machine Co, Inc	274-275
Firestone Industrial Products	394-395-396-423-424-425
J A Firaching & Son	376-377
Florence Thread Co, Inc	223-223A
The Formica Co	112C
Franklin Process Co	435-436
Gastonia Combed Yarn Corp	222-222A
Ginsberg Machine Co, Inc	433-434
Globe Dye Works	116
Grove Nylon Co	9-10
Harriet Cotton Mills	84A-84B
Hayssen Manufacturing Co	503-504
Heany Industrial Ceramic Corp	527
Oscar Heineman Corp	412-413
Hemphill Co	172 to 176 Inc, 205 to 209 Inc & 126-127
Henderson Cotton Mills	84A-84B
Herr Mfg Co	96B
Hoffner Rayon Co	246-247-282-283
Alfred Hofmann, Inc	360-361-384-385
Hosiery Industry Weekly	120-121
Hosiery Merchandising	120-121
Hosiery Mill Accessories Co., Inc	96A
Hosiery & Underwear Review	44A-45A
E F Houghton & Co	226-227
Howes Publishing Co	120-121
Indian Orchard Finishing Co	512
Loyal T Ives Co	244-245
Jacquard Knitting Machine Co, Inc	1A-1B-1-2-3-4-5-6
Jantzen Knitting Co	517
Johnston Mills Co	268-269
Kahn & Feldman, Inc	364-365-380-381
Samuel Kassow	117
Kaumagraph Co	224-225-230-231
Kidde Mfg Co, Inc	444-445-446-447-448-449

Exhibitor	*Booth(s)*
Walter Kidde & Co, Inc	41-42
A Kimball Co	287
Joseph Klumpp Co	406
The Knitter	370
Laconia Needle Co	217-218
Bruno Lederer	34
Percy A Legge	394-395-396-423-424-425
Leighton Machine Co	33
Leon-Ferenbach, Inc	124-125
Karl Lieberknecht, Inc	252-253-276-277
Lydon Brothers, Inc	45-46
Markem Machine Co	329-330-335-336
The Marquette Metal Products Co	89-90-91
Stanford Markey Distributing Co, Inc	12
Marvel Specialty Co, Inc	89A-89B
The Merrow Machine Co	431-432-461-462
Clarence E Meyers & Co	358-359-386-387
Mid-West Processors, Inc	185-196
A Milne & Co	7
Milton Machine Works, Inc	129
National Bundle Tyer Co	516
National Vulcanized Fibre Co	293-294
North American Rayon Corp	297-298-307-308
Ordnance Gauge Co	518-519
Pan-American Publishing Co, Inc	13
Plymouth Thread and Yarn Co, Inc	119A
Premier Textile Machinery Co	533-534
Queens Machine Co	529-530-531
Rayon & Synthetic Textiles	122A
Robert Reiner, Inc	16 to 23-23A-23B
Royal Cotton Co	31-32
Royersford Needle Works, Inc	311-312
San Giorgio	34
Sauquoit Silk Co, Inc	237-238
George Scheer	27
Scott & Williams, Inc	142 to 153, Inc
Sellers Mfg Co	31-32
A G Sewell	84A-84B
Shell Oil Co, Inc	83-84
Singer Sewing Machine Co	354-355-356-357-388-389-390-391
Sonoco Products Co	373-374
Southern Mercerizing Co	213-214
Southern Textile Machinery Co	392-393-426-427
Morris Speizman Co, Inc	86-87-88
Spun Fibers, Inc	123A
Stampograph Co, Inc	78
Standard-Coosa-Thatcher Co	215-216-239-340
Stewart-Warner Co	508-509
Sterling Engineering & Mfg Co	71
Stop-Motion Devices Corp	106-107-107A-108-109
Sun Oil Co	24A-31A
Supreme Knitting Machine Co, Inc	219-220-221-234-235-236
Synthetic Yarns	278-279-280
G H Tennant Co	62A-62B
A M Tenney Associates	286
Textile Age	8
Textile Industries	128
Textile Machine Works	318 to 322, Inc; 343 to 347, Inc
Textile Trimming & Boarding Machine Co, Inc	433-434
Textile World	85-92
Threads, Inc	505
Tompkins Brothers Co	454-455-456
The Torrington Co	331-332-333-334
Turner Transfer, Inc	526
E W Twitchell, Inc	65-66
Union Special Machine Co	323-324-341-342-348-349-366-367
United Knitting Machine Co	63-64
United States Rubber Co, Lastex Division	299-300-305-306
United States Rubber Co, Textile Division	459-460
U S Textile Machine Co	93 to 98, Inc
Universal Winding Co	130 to 135, Inc
Utica Novelty & Mill Specialty Co	80-81-82
Valdese Mfg Co	47-48
Veeder-Root, Inc	265
Victor Ring Traveler Co	510-511
G H Waterman & Co, Inc	503
Whitin Machine Works	414-414A-415-415A-440-441-452-453
Wildman Mfg Co	136 to 141 Inc

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ACCURACY OF VISUAL JUDGMENTS OF COLOR DIFFERENCES ON WOOL FLANNEL

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INTRODUCTION

IN MOST industrial processes in which color must be controlled, the judgments of a highly trained colorist are relied upon to control the expenditure of large amounts of both time and money. In a dyeing operation, for example, the colorist may judge the dyeing to be weaker than standard, therefore the piece must be redyed. Or in the manufacture of a dyestuff he may decide that the batch is greener than standard and therefore some red shading color must be added. In some cases, of course, a piece of goods or a batch of dye must be discarded or sold as sub-standard, and a considerable amount of money may be lost. In spite of these facts, however, few attempts have been made to determine the accuracy of colorists. If a very expensive measuring instrument is placed in operation in a plant, extensive data concerning accuracy and reproducibility are obtained before the instrument is trusted to control production. In like manner we should know what to expect of the most highly trained eyes, both for the best control of production and for protection of the colorist against impractical demands from management.

The purpose of this paper is to provide quantitative data on the consistency and accuracy of colorists in describing small color differences, on the differences between highly trained colorists and those less well trained, and on one group of colorists' conception of "acceptible match." The meaning of dyer's terminology and certain anomalies in this terminology will also be discussed.

CONDITIONS OF THE EXPERIMENT

Ideally, a study of this sort should be made on a large variety of colors, a large number of colorists should make judgments, and each colorist should make a large number of independent judgments of each sample. All of this is desirable because of possible differences between one color and another, between one observer and another, and because a single judgment of a very small color difference, even when made by an expert, is almost worthless. However, the collection of such a vast amount of data from individuals who are busy standardizing dyes or dyeings is almost an impossibility. Some compromises were therefore necessary. These compromises form the general conditions of the experiment and are listed below.

(1) Three color standards, a red, a blue, and a green were taken as representative of the color domain.

(2) About twenty samples having various color differences from each standard were chosen as fairly representative of color variations about the standard.

(3) Three groups of observers were chosen. Group A consisted of four highly skilled professional colorists. Group B consisted of four persons who understood something about color variations but had far less experience than the Group A colorists. Group C consisted of three "housewives" who had no knowledge at all of technical aspects of color differences.

(4) Each observer was asked to make three independent judgments of the color difference between samples and standards.

The three dyes chosen for the standards were Fast Light Red BA (Pr 101), Alizarine Supra Sky RA (Pr 207), and Light Green SFA (C I 670). Each standard was made by dyeing wool flannel with approximately 2% of one of these dyes. Small color variations were obtained simply by repeat dyeings, by the unlevelness of a

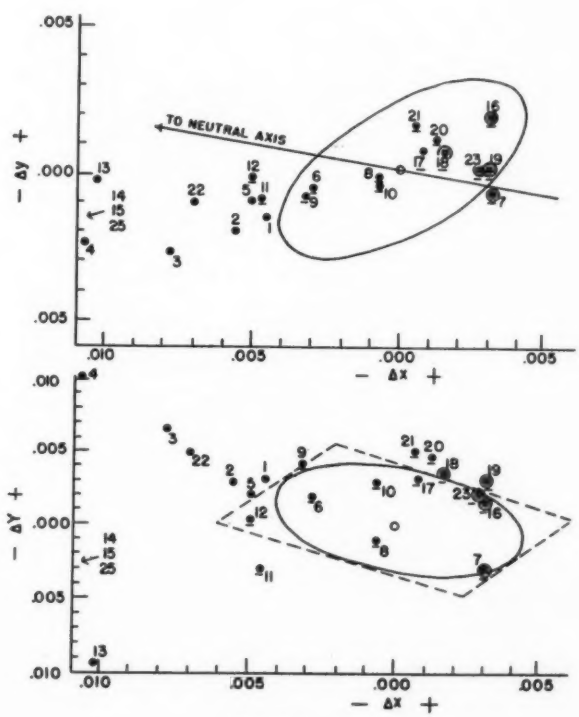

Figure 1

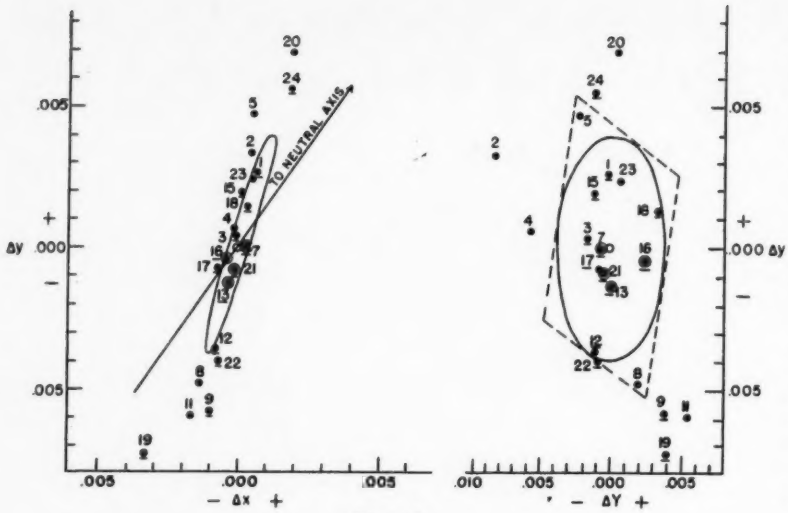

Figure 2

single dyeing between one side and the other of the 7" x 7" swatch, and by adding small amounts of shading colors and varying the strength of the dyebath very slightly. After dyeing, the wool was cut into 4" squares, folded in half and stapled onto a black 2" x 4" card. The folded cloth was slightly larger than the card so that the card was completely covered. One sample of each of the three sets of dyeings was chosen as standard and identified by a small piece of gray paper stapled to one corner.

The size and nature of the color differences between samples and standards are shown in Figures 1, 2, and 3. Here the differences in ICI coordinates between samples and standards are plotted in two diagrams for each set. An ellipse *(1)* is drawn about the standard to give a better idea of the size of the color difference. Any point within the ellipse in both diagrams for one set will not, on the average, be recognized as differing in color from the standard in more than about 2 out of 3 judgments made by the expert colorists. A complete description of the manner in which these ellipses were derived is described elsewhere.*(2)*

EXPERIMENTAL PROCEDURE

The observer was asked to hold the red standard and one of the red samples side by side on an 8½" x 11" sheet of gray paper in any position he wished and to change the positions of standard and sample in any manner he saw fit. This method of holding the samples on the gray paper was established so that a background of the same color could be used by all observers. The Group A and Group B observers were asked to judge each sample for brightness, hue and strength relative to the standard. The Group C observers were asked to state whether they saw any difference in color between sample and standard, and whether the match would be acceptable if they wanted a close match for fine clothing or draperies. When all of the red samples had been judged, the blue samples were compared with the blue standard and then the green samples with the green standard. The observers then began again with the red series and so on until each of the samples had been compared three times with its standard. Since the three judgments of each sample were not made consecutively and the observer had no way of identifying the sample except by color, these judgments must be considered as statistically independent of one another.

No attempt was made to determine the color differences quantitatively. The Group A and B observers simply stated whether the sample was brighter or duller, redder, bluer or greener, stronger or weaker, or identical to the standard in one or more of these attributes. The Group A observers were also asked to decide whether the color difference was sufficiently small so that the sample would be accepted as a match with the standard for most practical purposes.

In all cases, observations were made in light from the northern sky during normal working hours in August. The sky in each case was either clear and bright or just slightly cloudy and bright.

DATA OBTAINED

The judgments of the three groups of colorists on the three sets of samples are given in Tables I, II, and III. For Groups A and B, the judgment is given in the order brightness, hue, strength. "O" means

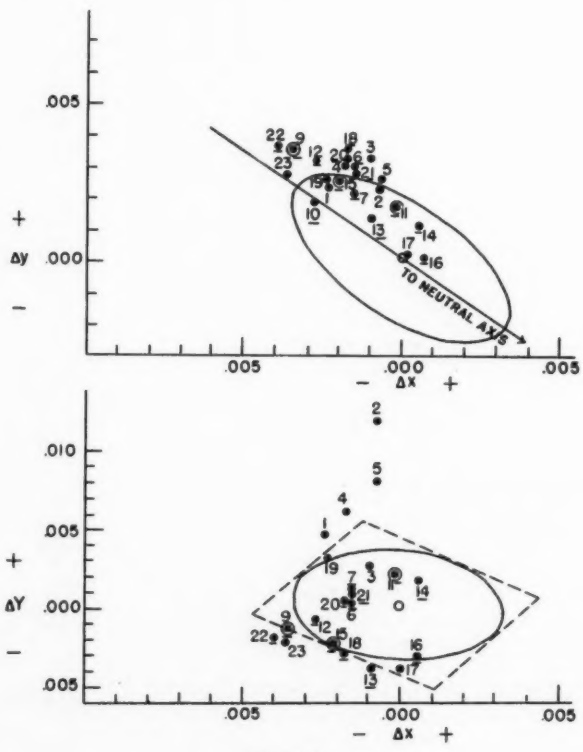

Figure 3

that the sample was judged a match with the standard or that it was specified as different from the standard only once in the three independent judgments. Lower case letters indicate that the attribute in question was judged twice as indicated, and upper case letters indicate that it was judged three times as indicated. Meanings of the letters, both upper and lower case, are: b = bright, d = dull, y = yellow, r = red, g = green, b = blue, w = weak, s = strong, and o = no differences between sample and standard. The subscript numerals after some of the judgments indicate the number of times the colorists called the sample an acceptable match with the standard. Where no numeral appears, the sample was called unacceptable in all three judgments. For example, consider Sample 1 in the Red Series given in Table I. Colorist A called this sample BBw, or bright three times, blue three times and weak only twice. Sample 9 in the same series he called

TABLE I
VISUAL JUDGMENTS
RED SERIES

Sample	*Group A*												*Group B*												*Group C*		
Red	*A*			*B*			*C*			*D*			*E*			*F*			*G*			*H*			*I*	*J*	*K*
1	B	B	w	O	B	W	b	B	W	O	B	W	D	B	W	O	B	W	d	B	W	O	B	W	3	3	3
2	O	B	W	O	B	W	B	B	W	O	B	W	d	B	W	O	B	O	O	B	w	O	B	W	3	3	3
3	O	B	W	b	B	W	B	B	W	O	B	W	d	B	W	O	B	W	O	B	W	O	B	W	3	3	3
4	O	B	W	b	B	W	B	B	W	O	B	W	O	B	W	b	B	O	O	B	W	O	B	W	3	3	3
5	d	B	W	b	B	w	b	B	W	O	B	W	D	B	w	O	B	O	O	B	O	O	b	w	3	3	3
6	O	O	O_2	O	O	O_2	b	b	W	O	b	w	O	O	O	O	b	O	O	O	O	O	O	O	1	1	1
7	b	O	O_2	b	O	O_2	b	B	W	O	b	W	O	b	O	O	b	O	O	O	O	O	O	O	0	1	2
8	d	O	O	d	O	w_1	O	b	W	O	O	W	O	b	O	O	b	O	O	O	O	O	O	O	2	1	2
9	O	b	W_1	b	O	O_2	B	B	W	O	O	W	O	O	O	O	O	O	O	O	W	O	O	w	3	1	1
10	B	O	w_1	b	O	O_2	b	B	W	O	O	W	d	b	W	O	B	O	O	O	O	O	b	O	1	1	1
11	D	b	W	d	b	O	O	B	w	O	B	w	D	B	O	O	b	O	O	O	s	O	B	O	2	1	1
12	d	B	W	O	B	W	b	b	W	O	B	W	O	B	w	O	B	O	O	B	w	O	b	O	1	1	3
13	D	B	O	D	B	O	D	B	O	D	B	O	D	B	O	O	B	O	d	B	s	D	O	O	3	3	3
14	D	B	W	D	B	W	D	B	W	D	B	O	D	B	O	O	B	O	D	B	O	d	B	O	3	3	3
15	D	B	W	D	B	W	D	B	W	D	B	O	O	B	O	O	B	O	D	B	O	O	B	O	3	3	3
16	b	Y	O	b	y	O_1	b	y	O_2	b	O	O_2	O	Y	O	O	B	O	b	O	O	O	O	O	1	1	3
17	O	Y	O_1	b	y	O_1	B	Y	w	O	O	W_2	b	y	w	O	O	O	O	O	O	O	O	O	0	1	2
18	b	Y	O_1	B	O	O_2	B	O	w_1	B	O	w_1	b	y	w	O	O	O	O	O	W	b	O	w	1	2	3
19	O	Y	O_1	B	O	s_1	B	y	w_1	B	O	O_2	B	Y	O	O	O	O	O	O	w	O	O	O	1	0	2
20	B	Y	S	B	O	O_1	B	y	W	B	y	O_1	B	Y	O	O	O	O	b	y	O	b	O	w	1	1	3
21	B	Y	s	B	O	s_1	B	Y	w	B	O	O_2	B	Y	O	O	Y	O	b	y	O	O	O	s	1	1	3
22	O	B	W	b	B	W	b	B	W	O	B	W	O	B	W	b	B	O	d	B	w	O	B	W	3	3	2
23	B	y	s_1	B	O	O_2	B	O	O	B	O	O_2	B	y	O	b	O	O	B	y	O	O	O	s	2	1	2
25	D	B	W	D	B	W	D	B	W	D	B	W	D	B	O	O	B	w	D	B	O	O	b	w	3	3	3

TABLE II
VISUAL JUDGMENTS
BLUE SERIES

Sample	*Group A*												*Group B*												*Group C*		
Blue	*A*			*B*			*C*			*D*			*E*			*F*			*G*			*H*			*I*	*J*	*K*
1	d	O	W	d	g	O_1	B	G	W	O	G	W	d	g	W	O	O	O	O	O	W	d	O	O	1	1	2
2	O	G	W	O	G	W	b	G	W	b	G	W	O	g	W	O	G	w	O	O	W	O	O	W	3	3	3
3	O	G	W	O	G	O	B	G	W	O	G	w_1	O	O	w	O	g	O	O	O	W	O	O	W	3	2	2
4	b	G	W	O	G	W	b	G	W	b	G	W	B	O	W	O	g	O	O	O	W	O	O	w	3	2	3
5	O	G	W	D	G	O	b	G	W	O	G	O	D	G	w	O	G	O	O	O	W	d	O	W	3	3	3
7	B	O	O_3	b	O	O_2	B	G	W	b	g	w_1	b	O	O	O	g	O	O	O	W	O	O	w	2	0	3
8	B	g	O_1	B	r	s	B	g	w	B	r	O_1	B	R	O	O	R	O	O	O	W	O	O	O	3	1	3
9	B	r	O	B	O	S	B	R	S	b	R	s	O	R	S	O	R	O	O	O	S	O	r	S	1	2	0
11	O	R	S	b	R	S	B	R	S	B	R	S	O	R	S	O	R	O	O	R	S	O	r	S	3	1	3
12	B	g	O_1	B	O	O	B	g	w	B	O	O_2	B	r	O	B	r	O	O	O	w	b	O	w	3	2	2
13	O	G	O_2	B	O	s_1	B	g	O_2	O	O	O_2	O	O	O	O	O	O	O	O	w	O	O	w	2	2	2
15	O	g	s	d	G	O	B	G	W	b	G	O_1	O	G	O	O	g	O	O	O	W	O	O	W	2	1	2
16	O	g	S	O	O	s_1	B	g	s_1	O	O	O_2	d	g	O	d	O	O	O	O	s	O	r	s	2	0	1
17	O	G	O	O	G	W	B	G	W	b	G	O	O	g	O	O	G	O	O	O	w	O	O	w	3	2	2
18	O	G	O	D	G	s	O	G	O	d	G	s	d	G	O	d	g	O	d	r	O	O	O	S	1	2	3
19	b	g	S	B	r	S	B	O	r	B	R	O	B	r	s	b	R	O	O	s_1	b	O	O	3	0	2
20	O	G	W	D	G	O	B	O	W	O	G	O	D	g	w	d	O	O	O	O	W	D	O	O	3	1	3
21	b	r	O_2	B	O	O_2	B	O	S_1	B	r	O	B	r	O	O	r	O	O	O	O	O	r	O	1	1	3
22	b	o	W	B	O	O_1	B	G	W	B	O	O_1	B	r	w	b	r	O	O	O	W	O	O	w	3	1	2
23	d	g	o	D	O	O_1	O	G	W	d	G	O	d	O	O	D	g	O	O	r	W	d	O	O	3	3	3
24	d	r	W	D	g	O	O	G	W	d	G	O_1	D	G	O	d	O	O	D	R	w	d	O	S	2	1	0

TABLE III
VISUAL JUDGMENTS
GREEN SERIES

Sample	*Group A*												*Group B*												*Group C*		
Green	*A*			*B*			*C*			*D*			*E*			*F*			*G*			*H*			*I*	*J*	*K*
1	B	Y	O	B	Y	O_1	B	O	w	B	O	w	O	O	O	B	O	O	O	O	W	O	O	W	3	1	3
2	B	Y	W	B	Y	W	B	Y	W	B	O	W	B	O	W	B	b	w	O	O	W	O	O	W	3	3	3
3	B	Y	w	B	Y	O_1	B	Y	w	B	O	W	b	O	W	B	b	O	O	O	W	O	O	W	3	1	3
4	B	Y	w	B	Y	O	B	y	w	B	O	W	b	O	W	O	b	O	O	O	W	O	O	W	3	3	3
5	b	Y	w	B	Y	W	B	y	w	B	O	W	b	O	W	B	O	w	O	O	W	O	O	W	3	1	3
6	O	Y	O	B	Y	O	B	Y	s	b	O	O_2	O	O	W	b	O	O	O	O	W	O	O	W	3	1	2
7	O	Y	S	B	Y	S	B	Y	O	b	y	s	B	O	O	O	y	O	O	O	O	O	O	O	1	0	1
9	B	Y	S	B	Y	S_1	B	y	s_1	O	O	S_2	O	O	O	O	b	O	O	O	O	O	O	O	1	1	1
10	b	Y	S	O	Y	S	b	Y	S	D	Y	S	O	y	S	O	y	S	O	O	s	O	O	s	3	1	2
11	b	y	O	B	Y	O_2	b	y	w_1	B	O	O_2	O	b	W	O	b	O	O	O	O	O	O	W	2	1	2
12	B	Y	S	B	Y	S	b	Y	O	B	O	s	b	y	O	O	b	O	O	O	O	O	O	s	1	1	2
13	B	Y	s	B	Y	S	B	y	O	b	y	S	O	O	O	O	b	O	O	O	O	O	O	O	0	1	2
14	B	Y	O	B	Y	O_1	B	y	w	B	y	O_2	O	O	O	O	b	O	d	O	w	O	O	O	2	2	2
15	B	Y	S_1	B	Y	S_2	b	y	O_2	B	y	S_1	b	O	O	O	O	O	O	O	s	b	O	O	1	1	1
16	O	O	s_2	O	O	S	b	O	s	O	O	S	B	b	O	O	b	s	d	y	S	d	O	s	0	0	3
17	O	O	S_1	O	Y	O_1	b	O	s_1	d	O	S	O	O	S	O	b	O	D	y	s	d	O	O	3	1	3
18	b	Y	s	b	Y	S	b	Y	w	B	O	s	B	O	O	b	y	O	O	O	O	O	O	O	1	3	1
19	B	Y	w	B	Y	O	B	y	w	B	O	S	b	O	W	b	B	O	b	y	w	O	O	w	3	3	2
20	b	Y	O	B	Y	s_1	b	Y	O	B	O	S	B	O	O	O	b	O	O	O	O	O	O	w	3	1	2
21	B	Y	O	B	Y	O_1	B	Y	w	b	O	O_2	B	O	O	B	b	O	O	O	w	b	O	O	2	1	3
22	B	Y	s	B	Y	S	b	y	O	b	O	S	b	O	O	O	y	O	O	O	O	O	O	O	2	1	3
23	B	Y	O	b	Y	s	b	Y	O	B	O	S	b	O	O	O	B	O	O	O	w	O	O	O	3	2	2

ObW_1, or equal in brightness two or three times, blue twice, weak three times, and once he called it an acceptable match with the standard.

The colorists of Group B were not asked to state whether the sample was an acceptable match with the standard because of their lack of experience; therefore, no subscript numerals appear after their judgments.

The observers of Group C were asked merely to estimate the size of the color difference between sample and standard, not to describe that difference. The numerals in the Group C columns of Tables I, II, and III are related to the size of the color differences estimated by the "housewife." Only three judgments were permitted here—perfect match, imperfect but acceptable match, or not acceptable match. A "0" indicates that the sample was called a perfect match either two or three times. A "1" indicates that it was called imperfect but acceptable three times; a "2" indicates that the sample was called imperfect but acceptable twice and not acceptable once, or that all three judgments were different; a "3" indicates that the sample was called unacceptable at least twice.

CONSISTENCY OF VISUAL OBSERVATION

A colorist concerned with production problems, whether they be manufacture of dye to a certain standard or the production of finished textiles of a standard color, must be able not only to see small color differences, but also to name them in such a manner that the color error between sample and standard can be corrected. This means that his terminology must be consistent. If he terms a certain color difference weakness, he must consistently call it weakness in order that he may know how to correct it.

Consistency ratings for the colorists of Groups A and B are given in Table IV. The average score each observer obtained on each of the three color series is given as a percentage, a perfect score being 100. The colorists were scored on each of the three color attributes, brightness, hue, and strength on each of the samples. If the observer described the same difference in one attribute on each of the three judgments, that attribute was rated "3" for that particular sample. If he described the difference twice but did not see it in one of the three observations, the score was "1." If the colorist failed to see a difference in more than one judgment out of the three, the score was "0," and if he described the difference in a contradictory manner, the score was "—1." Thus, if the colorist made the following three judgments of the sample

dull, blue, weak—1st judgment
dull, equal, weak—2nd judgment
bright, equal, weak—3rd judgment

his score for that sample would be —1, 0, 3 for brightness, hue, and strength respectively. The values given in Table IV were obtained by summing the scores for each series and reducing this value to a percentage of the total possible score. The upper three numbers in each block of the table represent the average scores for brightness, hue, and strength separately, and the lower figure is the average for all attributes taken together. This system of scoring, it will be noted, involves more than consistency alone. If the colorist consistently sees the sample and standard as identical, his score is "0," but if he consistently sees a difference, his score is "3."

There are several points of interest in the scores of this consistency study. Notice that the Group B observers, with the exception of observer E, are very much less consistent than Group A observers. On the green series, even observer E fails. Experience is certainly a very important factor in judging color differences in a consistent manner. An examination of the data plotted in Figures 1, 2, and 3 will indicate that the color differences in the red series are larger than in the other series and that differences are smallest in the green series. One would expect this to so affect the consistency ratings that the highest scores would be obtained in the red and the lowest in the green. Among the inexperienced Group B observers, this is exactly what happens. The group A observers, however, follow no such simple pattern. Observer B, for example, is outstanding in his judgment of greens.

Another interesting point is the difference between observers C and D on the green series. Their total scores are practically the same, but observer C detects little strength difference in the samples and observer D detects little hue difference in the samples. Apparently observer D sees a strength difference, whereas observer C sees the same difference as a hue difference.

It is quite apparent from the data of Tables I, II, III and IV that single observations should not be relied upon for very careful work even when highly experienced colorists are doing the judging. Samples of small color differences should be judged, set aside until those judgments are forgotten, then judged again and perhaps a third time. As more specific examples of the variability of individual judgments, consider the following. Each of these sets of judgments was made by one of the Group A colorists on the indicated sample, as shown in Tables I, II and III.

Red 8	1) Dull, blue, weak 2) Dull, equal, weak 3) Bright, equal, equal
Red 11	1) Equal, blue, weak 2) Dull, blue, strong 3) Equal, blue, weak
Green 16	1) Bright, blue, weak 2) Dull, equal, strong 3) Bright, equal, strong
Blue 15	1) Bright, equal, strong 2) Equal, green, strong 3) Equal, green, equal
Blue 8	1) Bright, green, weak 2) Bright, green, weak 3) Bright, red, strong

ACCURACY OF VISUAL OBSERVATIONS

The consistency scores discussed above are an important criterion of a colorist's ability, but cannot be the sole criterion. One can make a perfect score in consistency merely by deciding that he will call every sample exactly the same thing (e g, bright, blue, and weak) regardless of its appearance. Thus a measure of accuracy of observation as well as consistency of observation is needed. Two methods of determining accuracy might be used. The average of the colorist's observations might be considered as correct, or measurements made with the spectrophotometer and integrator might be chosen as correct. Both of these methods will be discussed.

Table V contains the average judg-

TABLE IV
CONSISTENCY RATINGS

Sample Series	Group A				Group B			
	A	B	C	D	E	F	G	H
Red	47 76 54 59	50 50 40 47	61 75 61 66	39 54 58 50	47 71 28 49	12 60 10 27	25 50 29 35	4 39 25 23
Blue	27 57 54 46	60 49 27 45	68 73 72 71	43 71 25 47	51 51 33 45	17 46 1 22	6 13 71 30	14 6 33 18
Green	67 88 36 64	79 95 53 76	58 59 14 43	68 11 61 46	29 3 41 24	29 9 5 14	5 6 41 17	—1 0 30 10

ments for each sample in the three series. In determining these averages, the judgments of Group A colorists only were considered and all individual judgments were given equal weight. The meaning of the symbols employed is the same as in Tables I, II, and III.

Accuracy ratings for the Group A and B observers are given in Table VI. In these tables, each colorist has been scored against the average judgment which is assumed to be correct. The method of scoring assumes a four step scale in which +2 is the score for perfect agreement between the individual judgment and the average and —2 is the score for complete disagreement. For example, if the average is G and the judgment is G, the judgment is scored 2, if g it is scored 1, if 0 it is scored 0, if r it is scored —1 and if R it is scored —2. Again, only average scores are given for each colorist and each series of samples. The meaning of the scores for the instruments will be discussed below.

In general, the results of these accuracy ratings are similar to the consistency ratings. Again, the inexperienced observers are found to be quite inferior to the experienced observers, particularly in judgments of the green samples. One interesting point derivable from these ratings is that the colorists of Group A are remarkably equal in competence. If the percentage scores for these four colorists are averaged over the three series, the results are 77%, 79%, 77%, and 77% respectively. Certainly the slight differences are very insignificant.

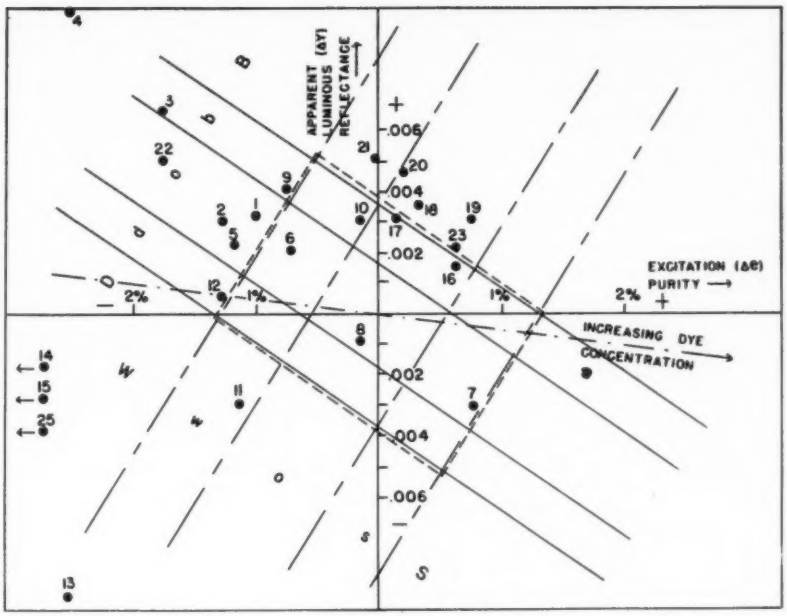

Figure 4

Before measured color differences and visual observations of color difference can be compared, it is necessary to convert the measurements as shown in Figures 1, 2, and 3 into the same language as that used by the colorist. The details of this translation have been described elsewhere *(2)*, but the final results are shown in Figures 4, 5, and 6. Briefly, the measurements shown in Figures 1, 2, and 3 have been replotted on coordinates of lightness (Y tristimulus value, parallel to Munsell value) and excitation purity (parallel to Munsell chroma, or departure from grey). Straight line contours were then drawn to give the best fit with the average visual judgment. As examples of the use of these contours, consider the following samples in the red series (Figure 4). The brightness and strength of sample 19 are judged B and O respectively, therefore the contours are drawn so that the sample plots in the B region for brightness and the O region for strength. Sample 3 is judged b and W, therefore it appears in the b region of brightness and the W region of strength. The limiting lines between w and W, s and S, b and B, and d and D thus define an area within which the differences between sample and standard are not detectable in more than about 2 out of 3 observations.

Having established the contours of Figures 4, 5, and 6 and, so to speak, calibrated the ICI system in terms of dyer's terminology, one may judge the samples

TABLE V
AVERAGE JUDGMENTS

Sample	*Red*	*Blue*	*Green*
1	b B W	O g W	B y w
2	O B W	O G W	B y W
3	b B W	b G w	B Y w
4	b B W	b G W	B y W
5	O B W	O G w	B Y W
6	O b w		B Y O
7	b b w	B g w	B Y S
8	O b W	B O O	
9	O b W	B R s	B y S
10	b O W		O Y S
11	d B w	b R S	B y O
12	O B W	B g O	B Y S
13	D B O	b g O	B Y s
14	D B W		B Y O
15	D B W	b G O	b Y S
16	b y O	b g s	O O S
17	b y O	b G w	O O S
18	B O O	d G s	B Y S
19	B y O	B O s	B y O
20	B y O	O G w	B Y s
21	B y O	B r s	B Y O
22	O B W	B g w	B Y s
23	B O O	d g w	B Y s
24		d g w	
25	D B W		

TABLE VI
ACCURACY RATINGS

Sample Series	*Group A*				*Group B*				*Instruments*
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	
Red	73 75 79 76	92 85 75 84	77 85 87 83	85 88 83 85	65 75 63 67	56 83 50 63	67 79 52 66	56 69 57 61	90 90 85 88
Blue	71 83 67 74	64 74 67 68	69 83 67 73	83 76 79 79	57 60 71 63	52 55 55 54	45 26 64 45	48 29 52 43	83 60 88 77
Green	77 82 84 81	93 80 80 84	80 84 57 74	75 39 84 66	48 25 48 40	48 0 45 31	9 27 48 28	14 25 41 27	93 82 77 84

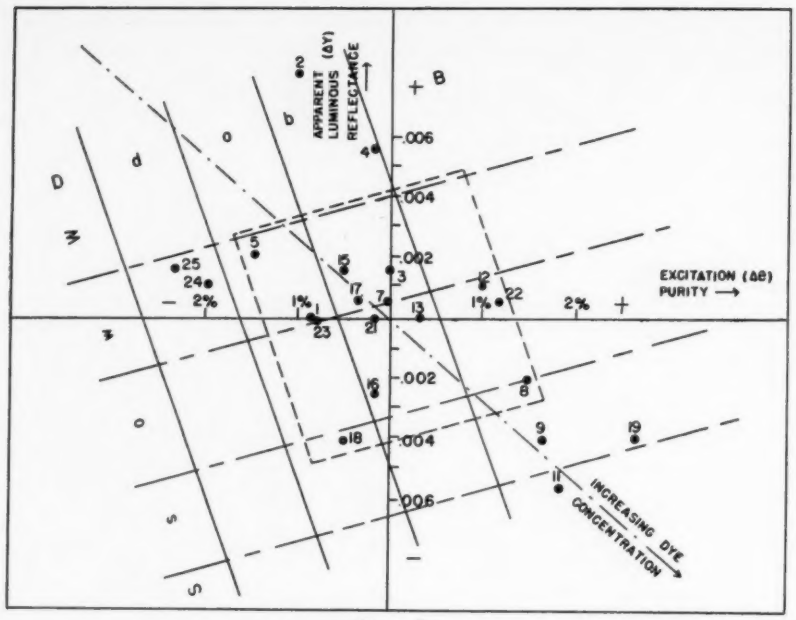

Figure 5

on the basis of the contours. These judgments are given in Table VII under method A. Here judgments were made on the basis of the ellipses shown in the x, y diagrams of Figures 1, 2, and 3. An ellipse half the size of the one drawn was imagined to be drawn in the same orientation as the larger ellipse. Differences between samples lying within this inner ellipse and the standard were assumed to be visually undetectable. Hue differences between the standard and samples lying between the inner and outer ellipses were assumed to be detectable in 2 out of 3 independent judgments, and all other samples were assumed to be distinguishable in hue from the standard in all independent judgments. The nature of the hue difference was, of course, determined simply by the nature of the change in dominant wavelength between sample and standard, or by where the values for the sample lay with respect to the line pointing from the standard values to the neutral axis.

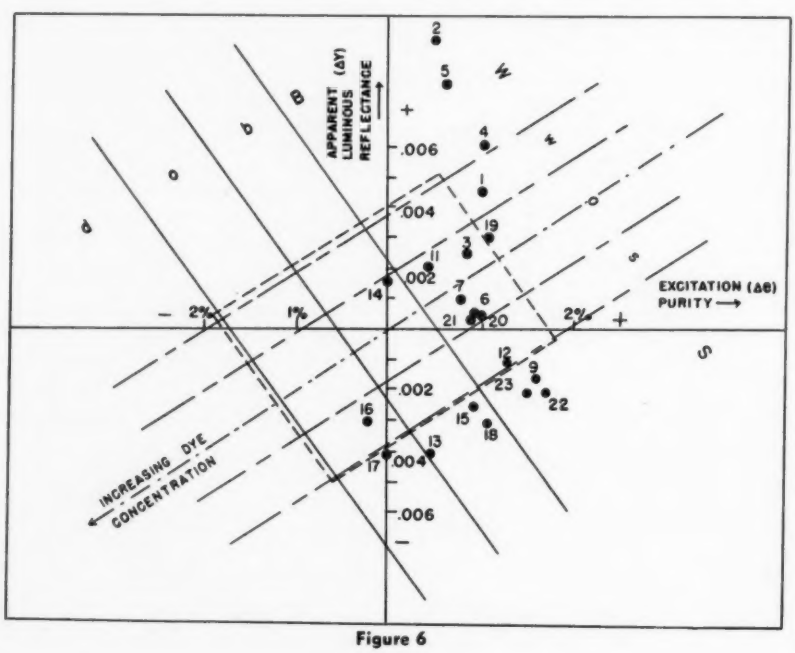

Figure 6

If we assume the average judgments of the colorists as given in Table V to be correct, then we can score the accuracy of the judgments based on measurements in the same fashion as the accuracy of the individual colorists was scored. This has been done under the heading "Instruments" in Table VI. The accuracy of the instruments *(3)*, it will be noted, is just as high as the accuracy of individual visual judgments when compared with the average. This means that once the ICI system has been "calibrated" in dyer's terminology, we can expect the measurements to be just as accurate as those of the most highly trained colorist.

Instead of assuming the average visual judgment to be correct, we might assume the judgments based on measurements to be correct. There is some reason for doing this because it appears as though visual estimates of brightness are erroneous in many cases. In Figures 5 and 6, note that the contours of brightness are not symmetrical with respect to the standard. In other words, the parallel lines which best fit the average judgments indicate that if the blue standard were compared with itself the colorist would call it bright. This means that there was, apparently, a definite prejudice on the part of the colorists in favor of calling the samples brighter than the standard. This may have been caused by an assumption that since the standard had been handled so frequently it must be dull and therefore the samples, which were handled much less frequently, must be brighter. A statement of this assumption was made by the colorists while making their judgments. However, since the measurements were made after the judgments were made, this assumption must have been false. Furthermore, the colorists claimed that this assumption did not influence their judgments. If the judgments based on measurements are to be taken as correct then the contours of brightness and strength should be centered about the sample. This was done by simply moving the contours without changing their positions relative to one another. The judgments based upon these symmetrical contours are given in Table VII under method B.

The accuracy of the observers is scored in Table VIII assuming the judgments of the samples given in Table VII, Method B to be correct. The method of scoring is the same as that used for Table VI. It will be noted that judgments by the more experienced observers of Group A are, on the average, more accurate in comparison with the instrument values than are the Group B observers. In the blues, however, the Group B observers appear to be slightly more accurate.

The results of the previous tables are summarized in Table IX. Here all three

series of colors are averaged to obtain a total figure. The observations of the Group A and B observers are averaged to obtain a single figure for each group, and the samples have been divided into large color differences and small color differences. Those samples which lie within, or very close to, the borders of the experimentally determined ellipses in Figures 1, 2 and 3 were considered to differ by only a small amount from the standards, all other samples were considered to be large color differences from the standards. It will be noted that the greatest superiority of the experienced colorists lies in their consistency. The experienced observers are also markedly superior in accuracy if the average of their judgments is considered as correct. The judgments based on instrumental measurements are seen to be somewhat more accurate than the experienced observers and far more accurate than the less experienced ones. If the judgments based on instrumental measurements and the method of translating these measurements into the colorists' language described above are considered to be correct, there is less difference between accuracy of the more and the less experienced observers, although the former are more accurate.

One point concerning the judgments on large and small differences is of interest. Note that if judgments based on measurements are assumed to be correct, the Group A observers are more accurate than the Group B observers on large color differences, but on small color differences there is no significant difference between the two groups. The reason for this peculiar equality on small color differences is not clear. One of the Group B observers suggested that the experience of the Group B observers has been in the detection rather than the description of small color differences in experimental work, whereas the experience of the Group A colorists has been in production where large color errors must be corrected on the basis of the description of that difference. This may be true, but it hardly seems to be an adequate explanation. Observer G, for example, had no experience of any kind in judging colors although he was familiar with dyers terminology. The Group A observers have undoubtedly had more experience than the Group B observers in judging large color difference, but it is highly probable that they also have had more experience in judging small differences. There might be some effect of inaccuracy of instrumental measurements, but this seems doubtful in view of the high score for judgments both of large and small color differences based on measurements. The cause may lie in the prejudice of the Group A observers in favor of a dulled standard as described above, or perhaps in a greater willingness of the Group B observers to admit that no color difference exists between a sample and standard if they cannot clearly see it.

ACCEPTABLE COLOR DIFFERENCES

The previous discussion has been limited

TABLE VII
INSTRUMENT JUDGMENTS

	Method A			Method B		
Sample	Red	Blue	Green	Red	Blue	Green
1	O B W	O g w	B y w	O B W	d g O	B y w
2	O B W	b G W	B y W	O B W	O G W	B y W
3	b B W	b g w	B Y O	b B W	O g O	B Y O
4	b B W	b g W	B Y W	b B W	b g W	B Y W
5	O B W	O G W	B Y W	O B W	d G w	B Y W
6	O b w		B Y O	O b w		b Y O
7	O B s	b r w	B y O	O B s	O r O	b y O
8	O O O	B R O		O O O	b R s	
9	b b W	B R s	B Y S	b b W	b R S	b Y S
10	b O w		O Y S	b O w		d Y S
11	D B w	B R S	B y O	D B w	b R S	b y O
12	d B W	B r O	B Y s	d B W	b r O	b Y s
13	D B w	b O O	b O S	D B w	O O O	O O S
14	D B W		b y O	D B W		O y O
15	D B W	b G w	b y S	D B W	O G w	O y S
16	b y O	b g O	O O s	b y O	O g s	d O s
17	b O O	b G w	O O S	b O O	O G O	d O S
18	B O O	O g s	b Y S	B O O	d g s	O Y S
19	B y O	B R s	B y O	B y O	B R S	B y O
20	B O O	d G w	B y O	B O O	D G w	b y O
21	B y w	b O O	B Y O	B y w	O O O	b Y O
22	O B W	B R O	B Y S	O B W	b R O	b Y S
23	B y O	O g w	B Y S	B y O	d g O	b Y S
24		d G w			D G w	
25	D B W			D B W		

TABLE VIII
ACCURACY RATED AGAINST MEASUREMENTS

Sample Series	Group A				Group B			
	A	B	C	D	E	F	G	H
Red	69 73 79 74	85 81 73 80	65 79 62 69	83 85 69 79	67 75 58 67	58 77 52 62	65 81 54 67	54 71 58 61
Blue	67 45 62 58	64 67 81 71	21 52 38 37	64 69 69 67	74 74 76 75	69 74 60 68	69 36 50 52	81 29 48 52
Green	61 80 68 70	61 70 73 68	66 80 39 61	73 41 84 66	43 30 48 40	68 0 50 39	48 32 45 42	41 32 36 36

TABLE IX
SUMMARY OF RATINGS

	Group A	Group B	Instruments
Consistency of Judgments			
Small color differences	42%	16%	
Large color differences	63%	35%	
Accuracy of Judgments vs. Average Judgments			
Small color differences	75%	47%	79%
Large color differences	80%	50%	87%
Accuracy of Judgments vs. Measurements			
Small color differences	62%	61%	
Large color differences	70%	52%	

to the perceptibility of color differences. It will be apparent, however, that there are cases in which a small color difference may be perceived between a sample and standard but that this difference is so small that the match will be considered acceptable. Group A and Group C colorists were asked to indicate which of the samples they considered a match with the standards, and their judgments are recorded, as previously described, in Tables I, II and III. These judgments have also been recorded in Figures 1, 2, and 3. A circle around the sample position indicates that it was accepted at least five times by the Group A colorists out of the total of 12 independent judgments which they made. A dash under the sample position indicates that the Group C observers accepted it at least 4 times out of the total of 9 independent judgments which they made. These samples, then, were accepted in about one out of two observations by one or the other of the two groups of observers.

It will be apparent from an examination of Figures 1, 2, and 3 that the "housewives" of Group C are considerably less critical than the professional colorists of Group A. However, it is difficult to draw an "acceptability" ellipse on the basis of these data. For example, in Figure 3, Sample 17 is closer in color to the standard than is Sample 13, yet Sample 13 is accepted and Sample 17 is rejected. Many other similar cases may be found. This appears to indicate that the "housewife" has only vague criteria of acceptability and is very prone to accept at one time what she will reject at another. This, of course, is not at all surprising. We can say, on the basis of these data, however, that any sample which lies within the ellipses shown in Figures 1, 2 and 3 will be considered by the "housewife" as an acceptable match with the standard in at least half of the judgments.

The colorists of Group A seem to have just as vague a set of criteria for judging acceptability as do the "housewives." It is even more difficult to draw an acceptability ellipse for the Group A colorists. This seems to indicate the necessity for establishing more definite criteria for acceptability.

ERRORS IN VISUAL JUDGMENTS OF STRENGTH

When a colorist judges a sample as weaker than a standard, he should mean that if the proper additional amount of dye is applied to the sample, the sample will come closer in color to the standard. Strength, in other words, should be an operational term. We should expect, therefore, that there would be a very close correlation between that color difference which the colorist calls strong and that which in practice is obtained if the dyeing is made stronger. To determine how nearly the term "strength" as used by the dyer actually is operational, several samples were dyed, differing from the standard in concentration only. After measurement and plotting in x y and x Y or y Y diagrams, the locus of samples differing only in strength from the standard could be determined. This locus was then transferred to the diagrams given in Figures 4, 5 and 6. In each case this locus is, over the region with which we are concerned, a straight line. If there were an exact correlation between visual judgments and this empirically determined line, then the contours of strength in these three figures should be perpendicular to this line. An examination of the relative slopes of the strength contours and the empirical strength line indicates that in the case of the red series, Figure 4, the colorists give a little too much weight to lightness differences and not quite enough to purity, or chromaticity differences. The same is true with judgments of the blue series, Figure 5, but here the errors are even larger. In the case of the green series, Figure 6, the judgments are entirely fallacious. The particular green dye, Light Green SFA, used in the particular concentration chosen, 2%, increases in both chromaticity and lightness when slightly lower concentrations are used. Thus what the dyer calls brightness is, in this case, both brightness and strength. Sample 10, which the colorists agree differs from the standard only in being stronger, could not be brought to match the standard by a decrease in strength.

DYEING ERRORS

The previous discussions have shown certain relationships between visual color differences and measured color differences. In practice it is also necessary to know just what the sampling errors might be. If, for example, one cut a small piece out of a bolt of cloth, compared it with a standard and decided that it matched the standard, what would be the probability that another piece cut at random from the bolt would also match? A complete answer to this question is far outside the scope of this paper, but a few observations made on the samples studied are of interest.

Red Sample No. 10 was cut from the same 7" x 7" piece of cloth as was the red standard, yet, as may be seen in Figure 1, the color difference between the two samples is almost great enough to be detected with certainty. It was accepted by the Group A colorists as a match in only three out of the twelve independent judgments. The Group C observers, however, accepted it as a match. Red Samples 18 and 19, and 16 and 17 were also cut from the same cloth. In general, it appears as though errors in dyeing, at least in beaker dyeing, may be represented by ellipses about one half or two thirds the size of the ellipses shown in Figures 1,2, and 3. If a dyebath is to be corrected to closer tolerances than these ellipses, then, it appears as though more than one sample should be judged.

CONCLUSIONS

The conclusions based upon data obtained during this study may be summarized as follows:

A) The most apparent difference between highly experienced colorists and less experienced ones is that the former are very much more consistent than the latter. Highly experienced colorists are also more accurate than less experienced ones if the average judgments of the experienced colorists are taken to be correct. If, however, judgments based on measurements are taken to be correct, there appears to be no significant difference in accuracy between more experienced and less experienced colorists on the judgment of small color differences. All of these data seem to indicate that an untrained observer sees color differences as small as those seen by the trained colorists, but is less able to describe those differences.

B) The accuracy of experienced colorists in judging the samples described is shown by the ellipses in Figures 1, 2 and 3. If the standard plots at the center of the ellipse, then any sample lying within the ellipse will be judged correctly by the colorists in no more than about two out of three independent judgments. Errors in judgments of strength are shown by the lack of agreement between the strength contours based on judgments and the experimentally determined locus of strength variations shown in Figures 4, 5, and 6.

C) Single judgments of small color differences, even when made by experts, are of little value. Also, the unlevelness of beaker dyings is such as to make judgments of several different samples from the same dyebath highly desirable for accurate work.

D) There is very little agreement on the meaning of "acceptable match" even among experts. The necessity for better defined standards of acceptability is apparent.

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(3) Davidson, H R and Imm, L W, *J Opt Soc Am* 39, 942 (1949).

ABSTRACTS

Theory of Enzyme Desizing of Textiles

C L Kloss, *Rayon and Synthetic Textiles* 32, 81-2, 92, January, 1951.

Enzymes work only under their own terms or conditions, and each type of enzyme has its own conditions; some act on the alkaline side, some neutral and some on the acid side, and the temperature at which they are stable varies; but if we understand the conditions under which they work, desizing becomes more simple to understand. If a theory were to be evolved for enzyme activity as taken from results in textile application work, with animal, bacterial or fungus enzymes, it would be something like this:

"Enzymes act while they disintegrate. A given quantity of enzymes, applied at a minimum temperature and optimum pH (both varying with the type of enzyme used) with sufficient moisture present, will do a definite amount of work over a period of time, provided the reaction can be carried to completion without interference by other reactions; at a higher temperature, under the same conditions, the same quantity of enzymes will do the same amount of work in a shorter time; and at the optimum temperature the same quantity of enzymes will do the same amount of work in a few seconds."

If this is true (and it appears to be borne out), then, when enzymes are applied with proper moisture present, at the optimum pH, at a temperature where the bath is stable, and carried through the optimum temperature, we shall get the maximum efficiency in the shortest time.

The author describes the methods employed for desizing in various types of machines (padder, open washer, jig, dye beck, and singe box), and also discusses continuous desizing.—WHC

The Assessment of Damage in Wool Materials

C S Whewell, *Textile Recorder* 68, 91-2, January, 1951.

In the testing of wool, each method has its particular virtue while none is perfect. Information of the greatest fundamental significance can be obtained by measuring the properties of single wool fibers, but since the testing of single fibers requires the use of delicate apparatus, the method is not generally suitable. Measurements of tensile strength and elongation of threads and cloths are those most extensively used in factory routine work because they yield information on properties which are closely related to the performance of the finished yarn or fabric.

Alkali solubility (i e, the loss in weight which occurs when a sample is boiled in a solution of 0.1 N sodium carbonate) may often be used as a guide to the condition of a piece of fabric, but if the material has previously been treated with alkali, the results tend to be misleading. The test is easily carried out and is sufficiently simple for use in process control.

Staining methods involving the use of Kiton red, methylene blue, indigo carmine, or the Pauly reagent find application in special cases (e g, in assessing the levelness of chlorination), but care has to be taken in interpreting the results. Damaged fibers are usually stained more deeply than undamaged, but this does not, of course, apply to the changes produced by several chemical treatments which decrease the dye affinity of the wool, e g, treatment with hydrogen peroxide, alkaline sodium hypochlorite, sulfuric acid under carbonizing conditions, or acetylating agents.

Measurement of the resistance to abrasion of wet wool fabrics has been useful in demonstrating the degrading action of various acid and alkaline solutions. Thus, solutions of pH 4.9 to 6.2 have very little degrading effect even at high temperatures, but as the pH value rises above 6.2 or falls below 4.9, increasing temperature promotes damage.

There is clearly a necessity for pH control in operations such as crabbing and blowing, for not only is the amount of permanent set determined by the pH value, but the amount of damage increases rapidly at pH values greater than 7. —WHC

The following papers were read at a Symposium on Fabric Stabilization conducted by the Quebec Section of the Canadian Association of Textile Colourists and Chemists on January 20, 1951.

Stabilization of Cotton Fabrics

C Wills, *Canadian Textile J* 68, 49-51, Feb 16, 1951.

When water is absorbed by a cotton fabric, the yarns swell laterally approximately 14 per cent; and since both warp and filling, due to their increased diameter when swollen, require much more room, they are forced to diverge from their path so that they cover a lesser distance in the fabric, and the fabric therefore shrinks. In the laundry this condition is intensified by the use of hot soap solutions. Alkaline washing compounds, and particularly weak caustic at the boil, increase the swelling to a greater degree than water alone.

The effect of a full mercerization on a cotton fabric is quite marked in various ways, but for fabric stabilization it is an outstanding process, as it reduces the washing shrinkage to at least half that of the same fabric given an ordinary finish, and the effect of repeated washings is negligible.

The effect of this process on the fiber is to convert its flattened, spiral tube state to an almost round tube form in which the spiral twist is absent. This change in fiber characteristic is responsible for the big difference in shrinkage during laundry washing and repeated washings, as there is no restriction to fiber movement similar to that encountered in the native fiber with its spirals.

Resin stabilization was originally introduced to produce a "resistance to creasing" finish for cotton, linen and rayon fabrics. It was found that fabrics treated by this process also possessed other valuable properties, such as decreased laundry shrinkage, improved fastness of certain dyestuffs, and among other features, increase in tensile strength.

The two resins mainly used for this process are urea-formaldehyde and melamine-formaldehyde, and the success of the process is dependent to a large degree on the introduction of the resin used within the fiber itself. The amount of resin required for cotton stabilization is usually between 5 and 7½ per cent, but on mercerized fabrics 5 per cent, if properly applied, will give quite satisfactory stabilization with a wash test shrinkage of from 1½ to 2 per cent in the warp.

The two main changes brought about by the resin application to the cotton fiber are (1) a 40 per cent reduction in the absorption of water by the fiber, and (2) a reduction of the swelling when wetted.—WHC

Shrink-Resistant Rayon Fabrics

M L Staples, *Canadian Textile J* 68, 51-3, Feb 16, 1951.

The purpose of this paper is to consider some of the ways in which rayon fabrics may be treated to make them resistant to shrinkage, and also to discuss certain other aspects of the subject of stabilization.

At the outset let us consider which factors contribute to the shrinkage of a rayon

fabric so that we will have a better understanding of what a finish should do to prevent it. Shrinkage can be ascribed to two causes, (1) swelling and (2) the release of strains. Fairly large contractions may result from the release of strains which have been previously set in viscose fabrics.

As regards swelling, when ordinary viscose rayon is wetted, the fiber increases in cross-sectional area by about 65 per cent. It is obvious that if shrinkage is to be prevented, some means should be found to reduce the swelling of the fiber when it comes in contact with water or soap solution. It is also desirable that strains which are imposed during manufacturing operations should be relaxed, as far as possible, before the fabric is finished.

There are at least three ways in which the swelling of viscose rayon can be reduced. In some of the earliest attempts, cross-linkages were formed between adjacent cellulose chains by reaction with aldehydes in the presence of an acid catalyst. These cross-bonds tend to prevent the molecular chains from moving apart and hence the fiber does not absorb as much water.

The second way in which the swelling of rayon can be reduced is to fill the amorphous regions of the fiber with a three-dimensional lattice of a resin. Polymers used for this purpose are urea-formaldehyde, melamine-formaldehyde, and acetone-formaldehyde. In addition to the resin being deposited between the molecular chains, there is evidence to show that a certain amount of cross-linking may also occur.

A third way in which the swelling of cellulose can be reduced is by blocking some of the hydroxyl groups in the chain by replacing them with a less hydrophilic radical.

Occasionally mechanical relaxation processes such as Sanforizing are applied to rayon fabrics to overcome shrinkage, but this is only satisfactory if used in conjunction with some other treatment which will reduce the swelling of the fiber. An untreated rayon fabric which has been mechanically relaxed frequently results in a stretchy material, and because of this it is not likely to be satisfactory in service.—WHC

Shrinkage of Woolen and Worsted Materials

L H Turl, *Canadian Textile J* 68, 56, 59, 60, 62, 64, Feb 16, 1951.

At the outset a clear distinction must be made between two major types of instability in wool materials, a situation peculiar to wool. The first type, commonly referred to as *relaxation*, arises in a readjustment due to the release of residual temporary strains imposed upon the fibers during such processes as carding, drawing, spinning, winding, weaving or knitting, and the drying operations following wet finishing. It is the responsibility of the finisher to reduce as far as possible this latent or potential cause of shrinkage of the finished material.

The second type, known as *felting*, is due to the behavior of the wool fiber under conditions of mechanical agitation or rubbing in a moist state. This behavior, which is essential to the manufacture of many types of fabrics, can be overcome when necessary by the treatment of the fiber or the fabric to reduce the felting potential to zero (as, for example, by chlorination).

The rate at which the internal strains in fiber or fabric may be relieved is of great importance. The relationship between tension, temperature and time for wool fibers extended and maintained 40 per cent beyond their original length in water has been examined by Speakman. It is seen from his data that the decay of tension proceeds much more rapidly at higher temperatures, and is sufficiently rapid at temperatures close to the boiling point to permit virtually complete removal of residual tension in single fibers within a few minutes.

Residual deformation or set results from practically every manufacturing tension imposed on the fiber. The permanence of this set depends upon the conditions under which it is imposed. In general, strains arising from any given operation may be relieved by subjecting the fibers to a set of conditions of higher relative humidity and temperature than those under which the strains were imposed.

Well-known practical operations involving the application of these principles are found in the conditioning of yarn and the crabbing, decating, London-shrinking, sponging and pressing of fabrics. Crabbing, an operation carried out with hot or boiling water in a great variety of methods and equipment, is intended to relax the stresses residual from earlier spinning and weaving operations, at the same time permanently setting the fabrics in the desired form. Crabbing precedes dyeing and wet finishing, but a similar effect may be achieved following finishing by the treatment known as decating, which employs high pressure steaming, usually on a perforated core or roll.

London-shrinking is essentially a thorough dampening of the fabric, followed by a period of lying without tension in the damp state, with subsequent slow drying in the complete absence of tension. Sponging and pressing similarly serve to release residual stresses, particularly in such equipment as the Hoffman press, which establishes conditions of very high temperature and moisture regain over a short but sufficient length of time.—WHC

Stabilization of Nylon Fabrics

R D Bennett, *Canadian Textile J* 68, 54-6, Feb 16, 1951.

For complete stabilization of nylon fabrics at any temperature level, a combination of both temperature and time is required. For hot water treatment up to 212°F an exposure time of one to two hours may be necessary. In pressure steam, exposure times may vary from 30 minutes to one hour, whereas in the case of high temperature dry heat treatment a few seconds is adequate. If stabilization is considered in terms of molecular motion it may be appreciated why the time factor assumes such great importance.

Immersion in water at or near the boil or in an atmosphere of saturated steam will permit sufficient molecular movement to render a fabric dimensionally stable to normal washing, but will not permit establishment of a completely strain-free condition. At temperatures employed in dry heat treatment, 430-440°F, however, the fiber reaches a semiplastic state and thermal agitation of the molecules is sufficient to permit almost complete relief of molecular strains. This condition is reflected in a strain-free fabric of highly pleasing hand, drape and appearance.

It is felt, therefore, that to achieve not only complete stabilization, but the optimum conditions of hand, drape and appearance that are the result of nearly completely strain-free material, it is essential to treat the constituent fabric under conditions of high temperature dry heat. This last remark, of course, applies only in the case of fabrics which are intended for apparel use.

With regard to the use of high temperature dry heat, successful machines utilizing this technique were the multi-roll gas or electrically heated type on which treatment is accomplished by passage of the fabric over heated steel rolls, and the type where fabric passes over two or more hollow cylinders enclosed in a chamber through which hot air is circulated.

Open-width scouring on the jig is recommended prior to heat setting, since rope marks introduced by winch scouring are not always entirely removed by hot rolling.

It is essential that setting conditions be selected carefully for optimum results. Too low a temperature or too short an exposure time results in under-setting, with consequent high residual shrinkage and inferior hand and drape characteristics. Too high a temperature or too long an exposure, on the other hand, leads to severe yellowing and weakening of the fabric. Any yellowing which occurs as a result of heat treatment may be removed either by use of a Textone bleach, by tinting with a blue dye in the scour bath, or by the use of fluorescent dyes.—WHC

Proceedings of the
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APRIL 16, 1951

Cotton Group—

PACKAGE DYEING*

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The speaker in this paper discusses fully the general principles involved in certain factors concerned in the production of satisfactory dyeings on yarn in package form, such as kind of yarn, type of package and holder (perforated paper tube, perforated metal tube, Franklin spring and Barber-Coleman cheese), character of winding, extraction and drying of packages, and characteristics of the circulating machine itself. He purposely avoids lengthy consideration of those other factors of package dyeing so often covered in the useful treatises: namely, details of dyeing procedure, including wetting out, time cycles, temperatures and methods of salting.

INTRODUCTION

A PAPER bearing the title "Package Dyeing" generally refers to a treatise on the actual application of dyes in the pressure package machine. I could stand here and give you concrete procedures as to wetting-out, time cycles, temperature, salting, etc, that would yield a good dyeing, and I do not doubt that half of this audience could prove that they obtain just as good results by entirely different methods. Therefore, I am going to veer from this usual procedure and approach the dyeing problem from a different angle. This paper will consider only cotton-yarn processing.

There are many phases that enter into the art of dyeing. I believe we can safely say we are artists in our field, although we do not wear berets or long hair. As a matter of fact, most of us, after a few years at this art, have very little, if any, hair. We all realize that such elements as material, yarn package (type of tube or spring), winding, extracting and drying play an important role in package dyeing. I dare say, in a great many cases, one or more of the aforementioned items has spoiled an otherwise good dyeing.

The principal factors affecting package dyeing may be listed as follows:

material,
type of package,
winding,
dyeing,
extracting, and
drying

GENERAL DISCUSSION

MATERIAL—By material, of course, we refer to yarn. We will not delve too deeply into this topic. It is sufficient to say that it is absolutely essential that all the yarn for a dye batch comes from the same source and is made from the same staple. Trouble emanating from mixed staple is usually referred to as "tiger stripes." It reveals itself on the ends of the packages in the form of rings. The dyer can assure himself that this is the source of unevenness by reeling down to where the shade change occurs. Here he will find a knot showing where the two bobbins of different staple or yarn count were tied together. If still skeptical, he can make a knitting of this yarn. About two hundred yards of the yarn each side of the knot will suffice. Proceed to strip out the color and redye this knitted fabric with the color combination used in the original formula. There should still be a noticeable difference from one end to the other of the knitting, with the change occurring at the knot. Of course, we realize this latter test is not possible in a case where a vat or naphthol was originally dyed on the yarn.

In many cases a treatment with caustic soda and hydrosulfite at a high temperature helps to even out irregularities due to cotton having a different dyeing index, but this does not always eliminate it entirely.

Uneven mercerization will also give so-called tiger stripes, and I know of no way to overcome this problem.

Knitted fabrics, composed of wide stripes made with ingrain-dyed yarn, show every defect possible. One of these defects is caused by thick and thin places in the yarn, which develops highlights in the fabric. Although this is usually attributed to uneven dyeing, it is actually due to uneven spinning. We realize that uneven spinning cannot be entirely eliminated, but good spinning displays a minimum of this kind of variation.

YARN DYE PACKAGES—At the present time we have four popular types of yarn dye packages or yarn holders as follows:

⅝-inch perforated paper tube
1⅝-inch perforated metal tube
Franklin spring
Barber-Coleman cheese

Satisfactory work is being produced with all the above types, although each has merits as well as drawbacks. We will discuss the first three in detail and mention a few interesting points about the Barber-Coleman cheese.

⅝-INCH PERFORATED TUBE—To discuss the ⅝-inch perforated tube, it is necessary to bring the 1⅝-inch tube and Franklin spring into the picture at the same time for comparison. At the present time these two sizes of tubes are the most prominent, and many dyers hesitate in coming to a decision as to which type to install in the dyehouse.

There was a period during the thirties and the start of the forties when the ⅝-inch tube was most popular. I believe this was due to economy. The cost of this tube was approximately one cent, and many spinning mills were equipped to handle this size of tube with no changeover in machinery. What did this mean? Simply that a dyehouse did not have to

* Presented at the Twenty-ninth Annual Convention in Portsmouth, N H, on September 29, 1950.

purchase expensive yarn holders, tubing and coning equipment. The spinner did not make an extra charge for the winding on this size of tube, thereby furnishing the yarn for immediate use in the dye kettle. So far as the spinner was concerned, there was no additional cost since the cost of the extra doffing was offset by the elimination of the cones. Of course, he could have added a small charge for this operation, but most mills were hard pressed at that time to sell their production and were, therefore, willing to make this concession to increase sales.

Since these tubes were so economical, the dyer could ship them to his customer without the anxiety of having them returned as would be the case with the more expensive 1⅝-inch tube or the Franklin spring.

All types of dyeings are carried out on this ⅝-inch tube, although the average dyer has found considerable difficulty in obtaining the best results with vat and naphthol shades and with mercerized yarn. So far as other dyes are concerned, such as direct and developed shades, the overall results are good.

Another drawback with the ⅝-inch tube is that the openings, which allow the circulation of dye, are spaced too far apart. This prevents even dyestuff penetration of the finer-count yarns near the tube and, in many cases, necessitates wasting a small amount of yarn on each tube. The newly developed paper covering over the tube helps to eliminate this trouble, but a better cushion and an increase in the number of openings in this paper tube are needed.

1⅝-INCH PERFORATED TUBE—The initial cost to equip a dyehouse with 1⅝-inch perforated tubes cannot be compared with the ⅝-inch paper tube. The average cost of this tube is fifty cents. One can see that this is a far cry from the one-cent ⅝-inch tube. However, when these tubes are handled correctly they are as economical as the ⅝-inch tubes because they will last for years. Supposing the spinner were equipped to wind on this type of tube; the cost of the number of tubes that would be necessary to supply the spinner, dyehouse, and customer would make their use prohibitive for most plants. So, therefore, it is readily seen that this size of tube makes it necessary to add a tubing and coning department.

On the other hand, let us consider the advantages. Naphthols and vats processed on this size of tube are usually cleaner and more even. There is no waste of yarn next to the tube as in the case of the ⅝-inch tube. This is true because there are more openings, which are both larger and closer together, and they allow better penetration. There is economy in handling this 1⅝-inch tube in the dyehouse, as the spindles hold up to nine packages high. This can be compared to the ⅝-inch spindles, which hold only from one to three packages high. Many dyers have increased the size of the package to two pounds and better with the

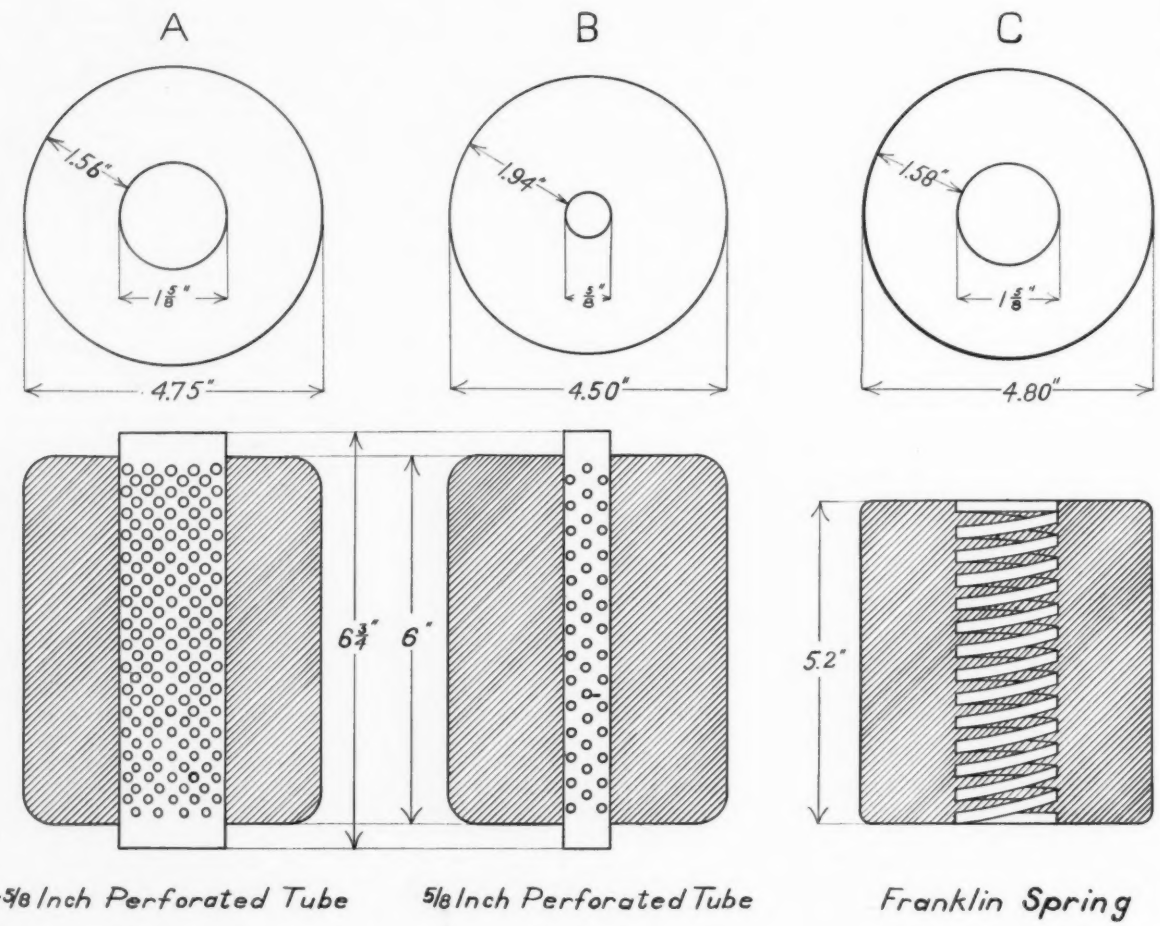

Figure 1

use of the 1⅝-inch tube.

FRANKLIN SPRING—There has always been a controversy as to the merits of the Franklin spring. Many millions of pounds are successfully dyed on this type package annually, not only at Franklin Process but at other large dyehouses. Many of these dyehouses may not be using the Franklin machine, but they utilize the Franklin spring on the same spindles used for the 1⅝-inch tube.

Here again, the springs, like the 1⅝-inch tubes, are expensive. They cost approximately twenty cents each. The life of the spring makes it as economical as the ⅝-inch tube, although it does not last so long. There should also be considered the cost of the knit sock, which is required with the use of the spring.

A dyer is usually able to increase the capacity of each spindle from 22 to 33 per cent with the use of the spring. This is due to the elimination of the use of separators and the compression of the spring to 5.2 inches as compared with 6¾ inches, which is the length of the rigid ⅝- or 1⅝-inch perforated tube.

There is also one point which a few years ago made the spring most advantageous, that is, the equalization of the densities of the individual packages on the spindle. When eleven or twelve packages are compressed on a spindle, the more loosely wound packages contract to the density of the firmer packages. This aids greatly in equalizing the flow through these packages. Of course, winders have been improved considerably, and so the necessity for equalization has been largely eliminated.

FIGURE I—Our first slide (Figure 1) shows a few of the mathematical comparisons of these three packages. Here are a cross section and a top view showing the diameters of each. These dimensions are all based on packages containing 20 ounces of cotton yarn.

A is the 1⅝-inch tube,

B is the ⅝-inch paper tube, and

C is a Franklin spring containing the same amount of yarn.

In the case of the Franklin spring one notices that instead of being 6 inches in length, it is only 5.2 inches long. This represents the length of the spring after it has been compressed on the spindle.

Note in A that the diameter of the package is 4.75 inches, and also that the distance is 1.56 inches which the dye has to traverse through the package. In B the diameter has decreased to 4.50 inches, but it is necessary for the dye to travel 1.94 inches, or an increase of nearly 25 per cent over the tube of larger size. While we are examining B, there is another very important fact to which I would like to call your attention, that is, the number and size of openings in this tube as compared with A. Actually, there are only 84 openings of ⅛-inch diameter as compared with 320 openings of 3/16-inch diameter in the larger tube. The next slide will give the actual ratio. C shows that the diameter has increased only slightly over that of A. This tube measures only 4.80 inches, which amounts to an increase of less than 2 per cent. The smallness of the increase is due to the compression of the package on the dye spindle.

FIGURE 2—Figure 2 shows the comparison of the surface areas of the 20-ounce packages. A-1 represents the total outside surface of the 1⅝-inch tube, which is 122.62 square inches. A-2 is the area of the space occupied by the yarn next to the tube. This total 30.62 square inches, or 25 per cent of the outside area. A-3 represents the area occupied by the openings through which the dye passes, a total area of 8.83 square inches, or 28 per cent of A-2 (tube area) and 7.2 per cent of the total outside area.

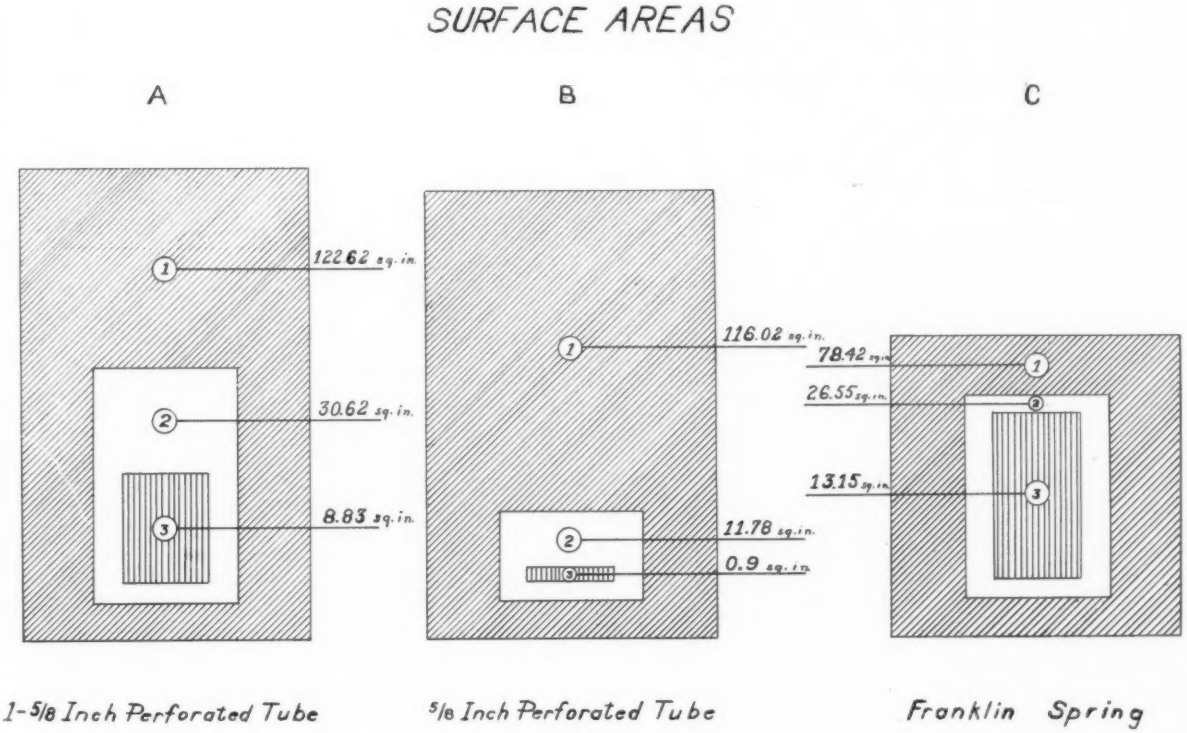

Figure 2

B-1 is the outside area of the same amount of yarn wound on a ⅝-inch tube. This has a total value of 116.02 square inches. B-2 represents the area of yarn in contact with the tube, a total of 11.78 square inches, or 10.2 per cent of the outside area. B-3 is the area occupied by the openings for dye passage and amounts to only 0.9 square inches. Percentage-wise it is only 7½ per cent of B-2 and 0.8 per cent of the total outside area.

C-1 represents the outside area of the Franklin spring, which is 78.42 square inches. One notices that the area is considerably less because of the fact that the ends of the package are not exposed to the dye liquor in the kier in the same manner as in the case of the rigid tube. C-2 is the area at the core which is 26.55 square inches or 33.9% of C-1. C-3, the area of the opening of dye passage, is 13.15 square inches or 49.7% of C-2.

From the above information, we can conclude that the 1⅜-inch tube and the Franklin spring have the following advantage over the ⅝-inch tube:

1. They have less resistance to dye flow because of more numerous and larger openings at the core.

2. The larger area at the core gives a better ratio to the outside area.

3. The distance from core to outside is much less.

If this last item (distance) were the only factor to be considered, one could increase the size of the package to 30.5 ounces; this radius would then only equal that of the 20 ounces of yarn wound on a ⅝-inch tube. However, because of the larger area at the core and less resistance to dye flow, many dyers have increased their 1⅜-inch dye packages to 36 ounces for cotton yarn. The limit for mercerized yarn at the present time appears to be 32 ounces.

From the above, one would expect that the Franklin spring would permit the dyeing of larger packages. Again we must consider another factor, namely, the compression on the spindle. Increased resistance from compression also appears to limit the size of the package to 36 ounces of cotton and 32 ounces of mercerized-cotton yarn.

BARBER-COLEMAN CHEESE — The Barber-Coleman cheese is a newer type of carrier and is gaining prominence, especially in cloth mills that have installed their own dyehouse. It is used almost entirely for dyeing warp yarn. The use of this carrier is a great economical advancement for the mill, but one has to see the actual warping of these dyed cheeses to appreciate this development. We dyed a batch of sulphur black and also sulphur blue on 14's/1 carded yarn for solid warp shades. The cheeses weighed 2¾ pounds. After the packages were dried, they were warped at 900 yards per minute with no difficulty.

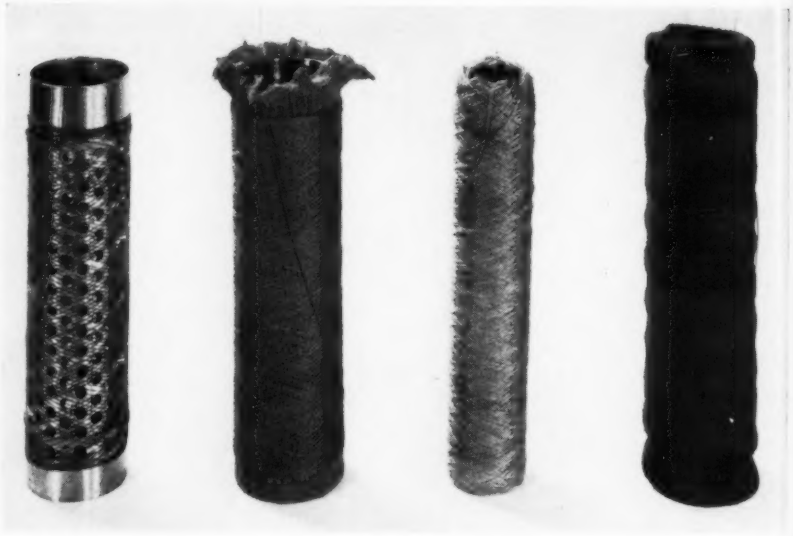

Figure 3

We have also dyed Coprantines and direct colors on cheeses of this size. For finer counts or with vat colors, it is necessary to cut the size of the cheese to 20-24 ounces. It appears that the success of dyeing cheeses is dependent upon exhausting the dye as slowly as po[illegible]le and upon being sure that the cheeses are not wound so hard that the circulation of dye liquor through the ends is prevented. Dyers have found that additional openings in the core allow better circulation and have greatly improved their dyeing results.

WINDING—Over the past few years management has realized that the winding room is really an important department and that the quality of workmanship bears a direct ratio to the results obtained from the dyehouse. The Number 102 Foster Winder and the Universal Rotor-Coner deliver superior and far more uniform winding than the older winders. However, the Number 50 Universal Winder still has a definite place in winding heavy yarns or cords for processing.

The winding tension should be the same for both the ⅝- and 1⅜-inch- tubes. The tubes should be soft but not so soft that the yarn will extend over the ends of the tubes during the dyeing cycle. This condition would not only prevent the dye from uniformly penetrating this area, but also would make the yarn difficult to rewind. On the other hand, one should not go to the other extreme and make the packages too firm as this would also prevent even distribution of the dye at the ends of the packages. The use of a rubber band on each end of the 1⅜-inch tube has replaced the use of the usual cumbersome knitted sock. These elastics are acid and alkali resistant. Like the knit sock, they eliminate roller cutting of the yarn at the start of the winding operation.

Notice in Figure 3 that we show the rewinding of yarn after dyeing. On the left we have a 1⅜-inch tube with elastics. Next is the same tube with the conventional knit sock showing its interference with delivery of yarn over the end. The third is a ⅝-inch tube with a tangling and sluffing at the ends, also the direct drag which tends to break the yarn. This makes rewinding of finer counts costly and gives an excessive number of knots when the winding gets down near the tube. The fourth, the Franklin spring, shows how the yarn sometimes works its way in between the coils with the result that rewinding becomes costly. This result can be kept to a minimum by the proper handling of packages and by the use of ball-top skewers. Thus, the cost of winding fine counts from a Franklin package may be as low as from a ⅝-inch tube.

The Franklin-spring package requires more tension in winding than the rigid tube. The package should be considerably firmer; otherwise, one of the following results may arise:

1. The packages will contract and settle. This action allows the dye to channel between the packages. When the machine is opened, one will find the packages have dropped, leaving a space at the top of the spindles.

2. It is necessary to add more packages

to the spindle to assure a firm column. This causes a narrowing of the openings between the coils of the spring and thus an increase in resistance and a decrease in the total flow of dye liquor.

Unlike the ⅝-inch or 1⅝-inch tube, the Franklin-spring package does not have to be crimped to break the firm ends. This firmness at the edges is overcome by the compression of the packages on the spindle.

Most package dyers have encountered packages that were not evenly penetrated half way between the top and bottom. This lack of uniform penetration is usually due to one of the following causes:

1. Too little tension, allowing the yarn to "jump-out" or "ride-over" the groove, which is used as a guide. The yarn then winds in an indefinite pattern in the center of the package. As the package builds and the correct tension is reasserted, this extra yarn in the center of the package exerts an added resistance to the dye flow at this point.

2. Tripping of the package by the automatic stop motion without breakage of the yarn. This raises the package from the winding drum and guide, but the momentum continues to rotate the package and to add extra yarn in the center. If this extra yarn is not removed before the winding is continued, unevenness may follow.

DYEING—As stated before, actual dyeing procedures will not be discussed here. The one factor in dyeing, however, that in my opinion is of the utmost importance is *the rate of flow through the package*. Without sufficient flow, one cannot expect to get even results for difficult shades. There should be a minimum flow of 2 gallons per minute per 20-ounce package. More is preferable, and most dye machines are now using pumps that give a flow of 3 gallons or more per minute per package under normal resistance. Should you increase the size of the package to 2 pounds, it is necessary to have a proportionate increase of flow.

PRESSURE—Pump pressure is secondary, and back pressure should always be considered. Approximately 10 pounds of difference in pressure between inside and out is usually sufficient to do the job, that is, if one has a 20-pound pressure with a 10-pound back pressure, you should get a satisfactory dyeing. It also follows that if the back pressure is 30 pounds, the original pressure must be 40 pounds.

EXPANSION TANK—A large expansion tank for the dye machine is very advantageous for reducing and dissolving dyes, if the dyer so wishes. Many dyers have eliminated the older method of dissolving dyes in barrels and are now using the expansion tank for this work. Flow into the dye kier is then regulated by control of the valve on the return pipe.

An ample supply of steam, good water, (preferably softened) and good mechanical maintenance of pumps are also necessary for satisfactory work.

EXTRACTING AND DRYING—The extracting and drying of packages are closely related operations. The types of equipment most suitable depend greatly upon the size of the dyehouse.

Before going farther, we must acknowledge that count of yarn, density of packages and whether or not they are extracted hot from the dye kettle have a direct bearing on the amount of moisture that is removed in extracting. Also, density of package, count of yarn and atmospheric conditions all enter into the drying picture.

Small dyehouses with a production of ten thousand pounds or less per week do not obtain the maximum value from a costly vacuum extractor and port dryers. Here the use of a centrifugal extractor is economical because the dye-machine operator generally has extra time that he can use at the extractor. The dryers consist, in most instances, of an insulated room in which the heat is produced from unit heaters. This is a very economical setup. Dyehouses with a production of twenty thousand pounds and up find the vacuum extractor and blower dryer very advantageous. Of course, it is necessary to have additional carriers for the blower dryer.

When dyehouse production climbs higher than 125,000 pounds per week, the picture may again change. Here there is economy in centrifugal extraction and tray drying as this volume of production would necessitate a regular extracting crew.

Yarns extracted in centrifugal extractors for twenty minutes generally retain 40 to 50 per cent of moisture, based on the dry weight. Here it is necessary to plug the tubes in centrifugal extracting to prevent their collapse. This is not required with the Franklin spring. Most vacuum-type extractors now have a heating unit combined with them and the time cycle for extracting ranges from 30 to 60 minutes. The amount of moisture retained is about 40 per cent, though the yarn is hot when removed from the extractor, and this condition speeds up the drying.

The room dryer referred to for small dyehouses requires up to 24 hours for drying, while the port dryer greatly reduces this cycle. Three to eight hours is the time required for drying on the port dryer, the total time depending upon the density of the packages and other factors. Twelve to sixteen hours is required for tray drying.

A number of direct colors have a tendency to migrate on the packages when dried on the port dryer. It then becomes necessary to use the tray dryer for these shades to keep migration at a minimum.

The development and perfection of the electric air filter has been a life saver for many plants. Before this development, it was necessary to waste a small amount of yarn near the tube on bleached and pastel shades when dried on the port dryer. Also, in tray drying these light shades took on a dingy cast on the outside of the packages. The advent of the electric air filter entirely eliminated this difficulty of the deposition of soot and dust on packages.

CONCLUSIONS

From the foregoing it is evident that more than the correct application of processing is required to produce a satisfactory package dyeing. Proper control of all factors is necessary, and, without a good foundation, all other precautions may be of no avail. Everyone acknowledges the fact that satisfactory work is produced on all types of packages. In this paper I have stressed the advantages of both the 1⅝-inch perforated tube and the Franklin spring over the ⅝-inch perforated tube. These advantages are proved by the fact that many dyers have changed over their equipment to handle these types. As modern winding equipment can give uniform packages, the dyer should insist upon good winding. Rate of flow through packages is of primary importance; other requisites are control of pressure and ample soft water. Without all these three, the dyer cannot be certain of the results he may obtain. Finally, good extracting and drying, especially when supplemented by the electric air filter, complete the picture.

DISCUSSION

Question: I wonder if you can compare paper and Plastavon as covers?

Answer: Reports indicate that Plastavon is doing a more satisfactory job than the older type paper. Regardless of which is used care must be exercised to assure a cushion for the yarn if the openings of the dye tube are far apart, thus allowing the migration of the dye in this area.

Q: What about economy?

A: The Plastavon is more economical than the knitted sock but I do not believe that it gives as good a cushioning effect.

Cotton Group—

A NEW TYPE OF NON-WOVEN FABRIC*

JOHN F RYAN

The Kendall Company

A wide variety of non-woven fabrics has been introduced by the textile industry over the last fifteen years. They have all had one thing in common: at least some of the fibers are adhesively bonded to one another, thus limiting to some extent the fiber freedom.

This paper describes a new type of non-woven-fabric containing no bonding agent and with no interfiber fusion. Since the integrity of the fabric depends solely upon fiber entanglement and interlocking, such a material possesses properties markedly different from the properties of adhesively bonded fabrics.

The most obvious property is a relatively large degree of extensibility and conformability, coupled with high porosity and low density. Such a combination makes this product particularly suitable as a base for coating, saturating and impregnating, which can be done using conventional equipment. The material can also be dyed, starched, slit, etc in the customary manner or with minor machine adjustments.

This product has numerous interesting applications in the industrial and consumer fields.

INTRODUCTION

DURING the last 10 to 15 years, the textile industry has been paying considerable attention to a new type of product called "non-woven fabrics." There are several such products commercially available, and their properties and methods of manufacture have been adequately reported in review articles by Seymour, Schroder, Bendigo, and others (1, 2, 3) and even to a modest extent in the patent literature.

Because these products were new, and because they by-passed some of the steps in conventional textile fabrication, they received considerable publicity. The Sunday supplement writers soon had mankind starting life in disposable bibs and diapers, growing into disposable shirts and dresses, and shuffling off in a sanitary, disposable, one-use shroud.

By now, non-woven fabrics are not a novelty. They are established articles of manufacture, with their own particular markets and end uses to which their properties and economic status entitle them. They are standing on their own feet and are accepted into the family. They differ widely in properties, of course, as members of a family do. Depending on the nature of the base fibers used and on the methods of manufacture, they vary from quite soft, absorbent, tissue-like products to relatively firm sheets of low porosity. They are apt to reflect their origin in that, unless special processing methods are used, they show markedly higher strength in the long, or machine, direction than in the cross-wise direction.

Another feature common to the conventional non-woven fabrics is that they are all "bonded" by one means or another. That is, at least some of the fibers are adhesively united to each other to give the structure integrity. This bonding is brought about in a variety of ways: by coating or impregnating with resin or adhesive solutions, by printing spaced lines of adhesive on the fibrous web, by sprinkling adhesive or thermoplastic powders into the web, by mixing thermoplastic fibers with the base fibers, or by gelatinizing or swelling some of the fibers to the point where they become adhesive. In fact, practically all of the many ways of sticking two things together have been utilized in developing non-woven fabrics, if only on paper.

Webril-R, the new type of non-woven fabric I should like to present here, is inherently different from all these other, or "bonded" types. It is not a "bonded" fabric in the accepted sense, inasmuch as it does not depend upon resin or adhesive or binding material. The fibers are entangled and twisted and interlocked to provide fabric integrity.

In this broad sense, Webril-R is more like a conventional woven fabric than its other relatives. You can gradually unravel a woven fabric into yarns and untwist the yarns into the component fibers without breaking any bonds. With a piece of Webril-R you could tease the fibers out of the assembly. But so far as external appearance goes, Webril-R is probably less like woven cloth in appearance than numerous examples of other non-woven fabrics you may have seen. Superficially, it resembles felt. But the product as presently produced is made entirely of cotton, and it is recognized that an all-cotton bat cannot be felted by the wool-felt process.

I bring this point up, not to confuse you or to complicate the issue, but to point out the danger of sweeping judgments about the whole array of non-woven fabrics on the basis of any single property or any resemblance to other materials. Each should be evaluated on its own merits.

PROPERTIES OF WEBRIL-R

What, then, are the main properties of this type of non-woven fabric which differentiate it from other types?

Our present commercial Webril-R is made entirely of bleached, absorbent, cotton fibers. Therefore, as you would expect, the end product is highly absorbent. It also has very high capillarity compared with any other non-woven fabrics we have seen. Although soft and yielding, it is lint-free because of fiber interlocking. As presently sold, the weight ranges from about 70 grams up to about 250 grams per square yard, or from 6½ down to less than 2 square yards per pound. Its dry strength is of the order of 7 g per inch grab per gram weight as measured on the Instron, and the wet strength is usually about 50 per cent of the dry.

These are the basic, the bread-and-butter facts, facts of interest to the engineer and the control laboratory. Much more interesting are certain properties which are difficult to measure but which are apparent to anyone handling the material, properties related to the unusual structure. I have stressed the absence of "stickum" in the commercial Webril-R just referred to. You expect, therefore, a considerable degree of fiber freedom. The fibers are free to move and extend in the direction of any applied stress, and they do this until sufficient fibers have frictionally and mechanically interlocked to counter-balance the stress. Even very small stresses result in some degree of fiber readjustment.

But since the entangled fibers have a certain degree of elasticity and resilience, and since a twisted and convoluted configuration has been imparted to them, there is always a tendency to recovery of the original fiber position. For small stresses, this

* Presented before Twenty-ninth Annual Meeting in Portsmouth, N H, on September 29, 1950.

recovery is substantially complete. For greater stresses we find a rather broad, plastic region wherein the fabric still shows considerable tendency to restore itself to the unstretched condition. Of course, if pulled too hard it breaks.

This fiber displacement and extensibility naturally means that Webril-R is conformable. When it is wrapped around articles of varying contour, there is an adjustment to the varying stress, and the fabric literally flows and moulds itself to an irregular object. I can demonstrate this better than I can explain it in words by wrapping this roll of Webril-R around this object with varied contour.

In conformability and extensibility, then, Webril-R differs considerably from bonded fabrics. We can get considerable dislocation of the structure without losing the integrity of the fabric. It stretches in both directions like an elastic bandage.

And during this stretching or drafting operation, fibers may be drawn out of position from a state of maximum entanglement to a freer, less compact arrangement. Therefore the density decreases, and we say that the material has fluffed up, grown thicker, loftier, and more porous. Incidentally, this is one way of controlling the density and weight, apart from original manufacture. If it is too thick and dense, stretch it out to free the structure and decrease the weight, and then roll it down back to the desired thickness. In this sense it is like an extruded plastic sheet; it is a very placid and obliging material, retaining the last form and set of dimensions impressed upon it.

I might mention also that this fiber entanglement I have stressed is pretty well randomized in all 3 dimensions. It is true that in the present commercial product there is greater strength and more resistance to deformation in the long than in the cross direction. But the ratio of longitudinal to transverse strength is only 3 to 1 or less, compared with ratios of 7 to 1 or even higher in many other nonwoven fabrics. And this Webril-R resists delamination or splitting in a horizontal plane, demonstrating fiber entanglement from surface to surface, rather than a series of independent webs artificially held together by adhesive union.

USES

As a relative newcomer in the family of non-woven fabrics, Webril-R has not yet been tried in as many fields and for as many end uses as other types have been. An attempt has been made to guide the sales development in directions where the unique properties of the product offer distinct advantages. One such field is in the manufacture of artificial leather.

Presumably most of you are generally familiar with the manufacture of artificial leather, or leather-like products. Cloth is coated or paper is saturated with latex or some elastomeric solution or emulsion and then is impregnated with a pigmented resin and grained or embossed in the desired pattern.

Now both cloth and paper have certain disadvantages as leather bases. Cloth has very low extensibility compared with natural leather, and when saturated may have even less. Whereas leather has its fibers distributed and oriented throughout the sheet, in cloth the fibers are organized into interwoven yarns so that we have alternate regions of very high and very low fiber density. It is often difficult and expensive to apply enough resin or finish to cover up this alternation in density; the cloth weave pattern tends to show in the finished article.

Paper has a more satisfactory fiber distribution, but the fibers are short, adhesively united, and with practically no freedom of motion. Therefore, not only does a paper-based artificial leather have very low extensibility, but it is not conformable and will crack or break on being flexed.

Webril-R is used in this industry to distinct advantage. It is conformable, extensible, and with a high percentage of void space. From what I have previously said about fiber freedom and entanglement, it follows that we have here a base which more truly resembles the fibrous structure of leather. This resemblance carries through all of the processing steps. The final result is a smooth material with uniform fiber distribution, extensible as leather is, conformable like leather, flowing around irregular contours without puckering or wrinkling. I have here samples, illustrating the remarkable degree to which Webril-R simulates natural leather.

The extreme conformability of Webril-R has made it of interest to the plastics industry, particularly as a reinforcement for deep-drawn low-pressure moldings. You can readily appreciate the difficulty, or the impossibility, of drawing cloth or any other nonextensible base into such a contour as shown by this ice-bucket cover. This has Webril-R alone as reinforcement. Webril-R can also be used because of its smooth surface; here is a clarinet case where the primary reinforcement is a bat of mixed sisal and fiberglass. This gives adequate strength and impact resistance but leaves something to be desired in appearance because of the coarse fibers showing on the surface (I'm quoting the moulder here). A thin piece of Webril-R overlaying the main fiber bat adds greatly to the smoothness, luster, and sales appeal of the finished article.

Another field of utility for this nonwoven fabric derives from its soft, white, absorbent nature and its capillarity and freedom from lint. It is widely used as a special absorbent in hospitals and in surgical work, particularly for brain and neural work. In surgery of this type, the softest hospital gauze is too harsh and traumatic. Webril-R serves as a nonirritating, lint-free capillary blotter.

A second use in the hospital or ethical field is as an orthopedic bandage. When plaster casts or other supportive or corrective devices are applied to the human body, it is customary to use some form of padding underneath to eliminate chafing and excessive pressure. Here the conformability of Webril-R comes into play as it adapts itself to tapering body contours. It can be made to have the peculiar property of clinging to itself, so that it stays readily in place with no shifting, collapsing, or telescoping.

Webril-R also is meeting increasing acceptance as a consumer product. A lot of clean white absorbent cotton is used in the home, much of it in the form of small wrapped rolls of bulk-carded cotton lurking in every medicine chest and first-aid kit. This familiar bulk-cotton put-up is used for many purposes, from anointing babies to removing fingernail polish. But it is an inconvenient way of dispensing cotton, uneconomical and cumbersome. Most of the time you get too much or too little.

This material, cut into small squares, provides a convenient method of dispensing unit quantities of clean absorbent cotton. Furthermore, in use Webril-R maintains its pad-like form, wet or dry. It does not wad up and roll together, but continues to expose a maximum of surface.

The large percentage of void spaces had led one manufacturer to use it as a powder puff; I have samples of such a product here. They are colored; obviously, our Webril-R can be dyed as any cotton fibers are dyed. There need be no binder or sizing to interfere with dye penetration, no adhesive or noncotton fibers to give a differential dyeing effect.

Of course, in dyeing Webril-R, as in other types of wet processing with this material, the primary and inescapable nature of the beast must be kept in mind. It is extensible and conformable, more so wet than dry. If you throw it on a jig under full tension with no concessions, you will start perhaps with 200 yards 36 inches wide and end up with considerably greater yardage but drastically reduced width. This fascinates the Research Department but gets a very sour reception from Production.

However, by releasing tensions on the wet material, and by supporting it here and there on long carries, this product can

be wet-processed quite successfully. The machine modifications are usually minor; while you can't pull Webril-R through like cloth, you don't have to stand behind and push it through, either.

In conclusion, let me emphasize again that Webril-R is obviously not a universal replacement for woven textiles, any more than any other non-woven fabric fits that description. We have had fifteen years of non-woven fabrics, and we do not find loom-fixers and spinning hands selling apples on street corners. The manufacturers of spinning and weaving equipment still seem to be getting along very nicely.

What the non-woven fabrics have done is to broaden the range of textile potentialities by pointing out what can be done by thinking in terms of fiber arrays other than in interwoven yarns. Webril-R is presented here as the most recent addition to the commercial family, quite different in its properties and entering into new fields of utility as human imagination takes it into account.

REFERENCES

(1) *Rayon and Synthetic Textiles* 30, p 49 No 2, p 43 No 3 (1949).

(2) *Am Dyestuff Reptr* 38, 453 (1949).

(3) *Textile World* p 84 (Oct, 1944).

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Hudson-Mohawk Section Meeting Reports

January 17, 1951

Jack's Restaurant, Albany, N Y

APPROXIMATELY 65 were in attendance to hear Henry Millson, assistant director, Application Research Laboratory, Calco Chemical Division, American Cyanamid Company, present a paper on "Wool Dyeing." Mr Millson illustrated his talk with color slides.

The following were appointed committee heads for 1951 by Chairman Jack Hanlon:

Dining—John Merrill, Cluett-Peabody Co, Inc

Outing—Dave Hamer, Arkansas Co, Inc

Intersectional Paper—Harvey Gendreau, Sandoz Chemical Works

Publicity—Leonard S Lang, Cluett-Peabody Co, Inc

Membership — Ed Chevrette, Surpass Chemical Co, Inc

Respectfully submitted,

WILLIAM A NELSON, *Secretary*

March 16, 1951

Jack's Restaurant, Albany, N Y

The second dinner meeting of the 1951 series was held at Jack's Restaurant on March 16. T A Field, Jr, Research and Development Department, Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corporation, So Charlestown, S C, presented a paper entitled "Dynel—A New Textile Synthetic." This paper was supplemented with a dynel fabric exhibit.

Eighty-one (81) members and guests were in attendance.

Respectfully submitted,

WILLIAM A NELSON, *Secretary*

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Philadelphia Section Meeting Report

March 16, 1951

Kugler's Restaurant, Philadelphia, Pa

A MEETING of the Philadelphia Section was held on March 16th in the English Room of Kugler's Restaurant in Philadelphia.

Chairman A E Raimo, John Campbell & Co, introduced National Vice-President George O Linberg, who spoke briefly on Corporate Membership, its importance to our Association and its advantages.

John Koch, Artcraft Sales Co. and Chairman of the 1951 Outing Committee, announced that the anual affair would be held at the Torresdale-Frankford Country Club in Philadelphia on Friday, June 1st.

A paper was presented by Jackson A Woodruff, American Viscose Corp, on "Dyeing and Finishing of Chemstrand Acrylic Fiber." Following a question and answer period a second paper was presented by P J Wood, Royce Chemical Co, on "Continuous Stripping of Carpet Yarn Waste."

Dinner was attended by 213 members and guests with 255 at the technical session.

Respectfully submitted,

THOMAS H. HART, *Secretary*

PAPERS FOR GROUP MEETINGS AT NATIONAL CONVENTION

ANYONE desiring to contribute a paper to a group meeting at the National Convention in October should notify the Technical Program Chairman, William A Holst, National Aniline Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N Y, as soon as possible giving the title of the proposed paper and the group to which it is to be presented. Subjects to be covered in the four group meetings are: Dyeing, Printing, Finishing, and Auxiliaries and Testing. Complete information regarding the technical program appears on page P113 of the February 19th issue.

Annual Ladies Night, Western New England Section

THE Annual Ladies Night of the Western New England Section will be held on May 4th at Waverly Inn, Cheshire, Connecticut. Dinner will be served at 7 pm.

Speaker for the evening will be Dr Donald H Powers, Director of Research of Warner-Hudnut, Inc, who will discuss "What Makes Milady Beautiful."

CALENDAR

30th NATIONAL CONVENTION AND EXPOSITION

Hotel Statler, New York
OCTOBER 17-18-19

Auspices of
NEW YORK SECTION

Exposition Under Management of
CAMPBELL-FAIRBANKS, INC.

COUNCIL

April 20 (Raleigh, N. C.), June 15 (Hotel New Yorker, New York), October 18 (Hotel Statler, New York), November 16 (Hotel New Yorker, New York).

GENERAL RESEARCH COMMITTEE

April 20 (Raleigh, N. C.), June 15 (Hotel New Yorker, New York), October 18 (Hotel Statler, New York), November 16 (Hotel New Yorker, New York).

NATIONAL CONVENTIONS

1951: October 17-18-19, Statler, New York.
1952: Nov. 6-8, Boston.
1953: September 17-19, Hotel Stevens, Chicago.

HUDSON-MOHAWK SECTION

Meetings: May 11 (Albany), June 22 (Annual Outing).

MIDWEST SECTION

Meetings: May 5 (Hotel Schroeder, Milwaukee), June 16 (Outing, Lake Lawn Lodge, Delavan, Wis.), September 29 (Morrison Hotel, Chicago).

NEW YORK SECTION

Meetings: May 17 (Swiss Chalet), June 15 (Outing).

NORTHERN NEW ENGLAND SECTION

Meetings: May 18 (Andover C C, Andover), October 26 (L T I, Lowell), November 30 (Boston, Annual Meeting).

Outing: June 8 (Merrimac V C C, Methuen).

PHILADELPHIA SECTION

Meetings: September 14, October 26, December 7, January 18, 1952 (all at Kugler's Restaurant, Philadelphia).

Outing: June 1 (Torresdale-Frankford Country Club).

PIEDMONT SECTION

Meetings: April 21 (Raleigh, N C), June 29-30 (Summer Outing, Myrtle Beach, S C), September 22 (Annual Meeting, Charlotte, N C).

RHODE ISLAND SECTION

Meetings: April 27 (Wannamoisett Country Club), May 25 (Johnson's Grill), October 26 (Providence Engineering Society), November 16 (Johnson's Grill).

Outing: June 22 (Wannamoisett Country Club)

SOUTH CENTRAL SECTION

Meetings: May 12, December 1 (both in Hotel Patten). Summer Outing: August 24-25.

SOUTHEASTERN SECTION

Meetings: May 5 (Atlanta, Ga.), June 8-9 (Annual Outing, Radium Springs, Albany, Ga.), September 8 (Columbus, Ga.), December 8 (La Grange, Ga.).

WESTERN NEW ENGLAND SECTION

Meetings: May 4, June 22 (Outing).

NEWS

COMING EVENTS

AMERICAN ASSOCIATION OF TEXTILE TECHNOLOGISTS

Meetings: May 2, June 6, September 12, October 3, November 7, December 5 (Builders Club, New York).

AMERICAN CHEMICAL SOCIETY

Meetings: September 3-7 (New York, N Y).

AMERICAN SOCIETY FOR TESTING MATERIALS

Annual Meeting, June 18-22, Atlantic City, N. J.

Spring Meeting and Committee Week, March 3-7, 1952, Cleveland, Ohio.

Annual Meeting, June 23-27, 1952, New York, N. Y. (The biennial Apparatus and Photographic Exhibits will be held in conjunction with this meeting).

NATIONAL ASSOCIATION OF TEXTILE MACHINERY MANUFACTURERS

Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N. J.

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS

Knitting Arts Exposition, April 30-May 4, Atlantic City Auditorium.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES

Luncheon Meetings—Hotel Commodore (May 9, September 12, October 10, November 14).

Spring Outing—The Greenbrier, White Sulphur Springs, W Va (June 14-16).

Annual Meeting and Dinner—Hotel Commodore (December 11).

TEXTILE RESEARCH INSTITUTE

Annual Meeting, Nov. 8-9.

• Chemical Allocation Mechanism Set Up

With the unanimous approval of the Chemical Industry Advisory Committee, a mechanism has been set up by the National Production Authority to assure that vital chemicals will reach critical points in adequate quantity to provide for defense and essential civilian needs. The order (M-45) is a basic general allocation order, which does not in itself place any chemical under allocation, but provides the means by which any chemical may be allocated when need for regulation is demonstrated. It is similar to WPB Order M-300 under which chemicals were allocated in World War II.

NPA officials said that a continuing study is being made of the complex chemical industry with the objectives of simplifying administration of chemical controls and of holding to a practicable minimum the number of chemicals to be placed under allocation.

They point out that surveys will be made and the industry consulted before any chemical is placed under allocation. This would be done by an amendment to the general order, called a schedule, which would place a given chemical in one of three allocation categories (Appendix A, B, or C).

Both purchaser and supplier would be required to apply to NPA for authority to fill any order for a chemical placed under Appendix A.

For Appendix B chemicals, the purchaser would not be required to apply to NPA. He would certify, to the supplier, the use to which the chemical would be put, and the supplier would apply to NPA for the allocation.

Appendix C provides for an intermediate category between Appendix A (which would apply to materials regarded as most critical) and Appendix B (which would apply to those requiring least allocation control).

For smaller quantities of Appendix C materials the purchaser would certify the proposed use to the supplier, who would in turn apply to NPA for the allocation. On large purchases, however, both purchaser and supplier would apply directly to NPA.

Details pertaining to allocation of a particular chemical will be included in the schedule placing the material under allocation. These will include the effective date of allocation and all procedures governing the chemical which may be different fro mor in addition to the general conditions applicable to the appendix to which it is assigned.

As an aid to small business, each schedule will provide exemptions for small orders.

• Nyanza Official Dies at 68

Robert Schwarz

ROBERT SCHWARZ, 68, of Brooklyn and Lake Valhalla, N Y, treasurer and director of the Nyanza Color & Chemical Co, Inc, and president and director of the Franklin Import & Export Co, Inc, died on March 1 at Doctors Hospital, New York, N Y.

Mr Schwarz was born in Germany in 1882, where as a young man he received his basic training in the dyestuff industry. Later coming to the United States, he completed his education at Columbia University.

Mr Schwarz is survived by his wife and son, Robert G Schwarz.

• Du Pont Substitutes "Dacron" for "Amilar"

Du Pont's polyester fiber, originally known as Fiber V and only recently given the trade-name "Amilar", will be known in the future as "Dacron", a new trademark substituted when the company received advice of possible confusion between the term "Amilar" and an unrecorded commercial name.

• Foxboro Announces Opening of Knoxville Office

A new branch office of The Foxboro Company has been opened at 618 W Church Avenue, Knoxville 16, Tennessee. Marvin L Cleaton, Jr, formerly in charge of the company's office at Columbus, Ohio, has been transferred to become branch manager at Knoxville. Until now, manufacturers in the Knoxville area have been served by the Foxboro office in Atlanta.

• Semple Outlines Wyandotte Expansion Program

Robert B Semple

A step-by-step program of expansion that will accelerate the rate of growth that the Wyandotte Chemicals Corporation has enjoyed in the last decade has been announced by Robert B Semple, president. The program is slated to materially increase the manufacturing breadth and the industry-service scope of the sixty-one year old Wyandotte, Michigan enterprise, along with significant growth in research and development activities. Mr Semple pointed out that emphasis would be not only on the development of new products, but also on assistance to industrial chemical users of the corporation's products.

The program will involve the three chemical manufacturing and compounding plants located in Wyandotte, a suburban community on the Detroit River, eleven miles southwest of Detroit; the limestone quarries at Alpena, Michigan; the clay operations at Blue Mountain, Mississippi; and the compounding plant at Los Angeles, California.

Wyandotte, initially a producer of alkalies, is a major manufacturer of three of the four most essential industrial chemicals—chlorine, soda ash and caustic soda. Within the last few years it has expanded into the organic field and has developed a number of products in the field of detergents and industrial cleaning compounds. The activity now projected, Mr Semple said, will not only increase the output of the three basics but will provide processing facilities which will permit the company to upgrade the present line of products, with emphasis in the organic field.

The initial phases of the program, scheduled to be carried out within the next twenty-four to thirty-six months, provided equipment is available and no unforeseen difficulties in construction are encountered, will be followed by additional projects now under consideration in the Research and Development division and the Manufacturing Engineering department.

Plans have been under study for the past year and a half, and while they are based primarily upon the economics of civilian needs, company officials state that they do anticipate the extraordinary requirements of the mobilization program, especially in the additional chlorine and soda ash units.

Ground has already been broken in Wyandotte for a new research pilot plant and the Wyandotte Research Center, which will be approximately a city block and a half long and a half block wide. It will be next to the company's Administration building on the main thoroughfare. Occupancy of the building, which will house all the scientific and technical groups under the supervision of Dr Thomas H Vaughn, vice president of research and development, is scheduled for mid-1952.

The Center will be a functionally engineered, two-story structure, of modern architectural design. Interior construction on a ten-foot module basis will permit changes in laboratory size and arrangement with a minimum of disturbance to research activities.

Included in the Center will be special areas devoted to exploration in such fields as radio active tracers, nucleonics, electronics, organic and inorganic chemistry, sanitation and germicides, electroplating, physics, and the entire field of commercial cleaning served by the company's dishwashing compounds, laundry detergents, and metal and industrial cleaners.

• Rodney Hunt to Produce Standfast Machine

The Rodney Hunt Machine Co, Orange, Mass, has announced that an interim agreement has been reached with Standfast Dyers and Printers, Ltd of Lancaster, England, for Rodney Hunt to manufacture, for sale in the United States and Canada, the Molten Metal Dyeing Machine developed by Standfast.

It is pointed out that the machine has been in production at the Lancaster, England, plant of Standfast Dyers and Printers Ltd for several years with better than ten million yards of goods having been vat dyed commercially by this process. The claim is made that small or large yardages may be dyed with vat colors with equal facility and that clean-up time between shades has been reduced to an average of five to ten minutes, with virtual elimination of end to end and side to side shading. Rodney Hunt states that it feels that these features make the machine valuable to the dyers of this country along with the fact that a continuous vat dyeing process is available which is economical for the mill that handles relatively small yardage of any one shade.

The machine, however, is also of interest to the large producer of vat dyed fabrics. The very small dye bath which is utilized (slightly more than one gallon of dye liquor for a 60" machine) is said to insure even shades from end to end of a run, regardless of whether the machine is run at low or high speeds. The equalization of pressure obtained in the metal unit itself reportedly makes possible the continuous vat dyeing of jacquard styles with assurance that both high and low places of the fabric will be evenly dyed.

Featured with the Molten Metal Machine is a laboratory model which is used for shade matching purposes. It is claimed that when shades are matched on this laboratory machine, production batches of the dye liquor may be made to exactly the same proportion of dyestuffs and chemicals per volume of water with positive assurance that the shade produced by the commercial machine will be the same as that obtained in the laboratory.

Rodney Hunt Machine Co has recently completed a study of specifications and drawings as submitted by Standfast Dyers and Printers, Ltd and reports that they are prepared to discuss both price and delivery with prospective customers. A Rodney Hunt technician has visited the Standfast plant in Lancaster, England and is said to be familiar with the operation of the Molten Metal Unit. Further details are available at the offices of Rodney Hunt Machine Co, Orange, Massachusetts; or through their local representatives.

• Reeves Brothers Selects Name and Site for New Finishing Plant

A most modern rayon finishing plant, to be owned and operated by Reeves Brothers, Incorporated, will be located just outside the town of Bishopville, S C, and will bear the name of that community, according to an announcement by John M Reeves, president. The Bishopville Finishing Company will specialize in the finishing of year-round and summer weight rayon suitings and will be primarily engaged in finishing the rayon grey goods produced in the recently renovated Reeves Brothers' Osage Mill at Bessemer City, N C.

Andrew E Collins will be plant supervisor and finished goods sales will be managed by Thomas W Oliver, Jr, located at Reeves Bros main office, 54 Worth St, New York, N Y.

This is the third Reeves wholly-owned finishing plant. Others are the Fairforest Finishing Division, Spartanburg, S C, and the Columbus, Ga, plant, connected with the Eagle & Phenix Division.

• Avisco Licenses Textron to Use Pre-Setting Machine

Textron, Inc, Providence, R I, has been licensed by American Viscose Corporation to make and use in the United States and Puerto Rico the tricot pre-setting machine developed by Avisco's textile research department at Marcus Hook, Pa. Avisco previously licensed Holly Knit, Inc, of Mount Holly, N C, to make and use the machine, and the Van Vlaanderen Machinery Company, of Paterson, N J, to manufacture it.

All of the licenses are reported to be nonexclusive. The use licenses provide for the payment to Avisco of a royalty on the acetate rayon fabric and blends of acetate rayon with other fibers which are pre-set on the machine. Second nonexclusive licenses were granted to Textron and Holly Knit to use the machine on nylon fabrics and blends of nylon with other fibers.

The machine is said to eliminate the expensive tacking and untacking of the selvages, otherwise necessary in finishing tricot fabrics to prevent the setting of the curl in the edges during dyeing. It results in straight course lines, and prevents "crow's feet" and crease marks, it is reported. The machine also is said to control the stability of acetate rayon tricot, improve the hand, and permit the knitting of much longer lots, which in turn may be dyed in one strand.

• Hagan Building Reception Room Features Display Panel

A display illustrating the wide variety of industries served by the Hagan Corporation and its subsidiaries, Hall Laboratories, Inc and Calgon, Inc is a current feature of the new reception room of the Hagan Building, Pittsburgh. A special panel on the textile industry includes graphic drawings representing textile mill operations, together with flow diagrams of cotton, rayon and woolen mills and samples of fabrics processed with Calgon. Twelve uses of this glassy phosphate water conditioner in scouring, dyeing, sizing, kier boiling, delustering and other operations are listed.

The textile industry is also among those utilizing controls manufactured by the Hagan Corporation and served by Hall Laboratories, Inc, as water consultants.

A miniature woolen mill and rayon and cotton mill are among the buildings of a "model city" in an activated diorama designed to acquaint visitors and new employees with the types of industry served by the 17 divisions of the Hagan organization. Pages of a "history book" turn, and as each division is mentioned, lights flash on the miniature buildings representing the types of industry served by it.

At the climax, summarizing all of the services, all of the buildings are illuminated. The text points out that 94 of the 100 largest companies in America are served by the Hagan group.

• Dexter Advertising Account to Jules Lippit

The Dexter Chemical Corporation, Textile Chemical Division, New York, N Y has awarded its advertising account to Jules Lippit Advertising, Inc, New York. Trade papers and direct mail will be used, it is announced. Jules Lippit will serve as account executive.

• CSMA Detergents Division Announces Program

The Soap, Detergents and Sanitary Chemical Products Division of the Chemical Specialties Manufacturers Association has arranged the following program for the Association's semi-annual meeting, which is being held at the Drake Hotel in Chicago, April 30 and May 1, 1951.

"Dispensing of Dishwashing Detergents"—Dr John L Wilson, Economics Laboratory, Inc

"Hard Surface Cleaning"—J C Harris, Monsanto Chemical Co

"Milled Toilet Bars from Synthetic Detergents"—Dr V J Keenan, The Atlantic Refining Co

"Syndets, Present and Future"—Dr Foster D Snell, Foster D Snell, Inc.

"Photometric Evaluation of Brightening Agents"—Dr H Hemmendinger, General Aniline & Film Corp

"The Impact of Synthetic Detergents on the Fat and Oil Market"—J W McCutcheon

"Detergency Properties of Systems Containing a Solid Nonionic Detergents"—Dr H R Suter, Wyandotte Chemical Corp

"Nonionic Surface Active Agents in the Dry Cleaning Industry"—Dr G E Barker and H J Ranauto, Atlas Powder Co

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• Cheney Brothers Displays Natura Prints

Cheney Brothers has added a collection of hand printed fabrics to their line—the Natura prints, a series of 22 designs based on nature forms from tree bark to mushrooms to seeds and sanderlings. The designs are products of collaboration between Cheney Brothers and the Institute of Contemporary Arts of Boston, who undertook the assignment of scouting and screening young artists to design the prints and interpret them on cotton, linen and silk.

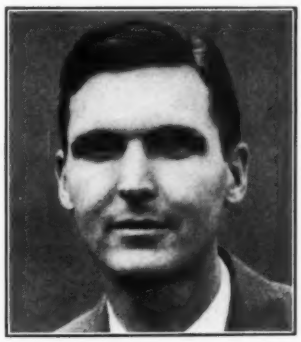
• SRRL Collaborators to Meet April 23

The regular annual meeting of collaborators on cotton fiber research will be held at the Southern Regional Research Laboratory in New Orleans, La, the week of April 23, Dr C H Fisher, Director, has announced.

Once a year, four specialists from industry and other research organizations engaged in the study of textiles review the progress made by his staff in advancing the fundamental knowledge of cotton fiber properties, Dr Fisher explained. These basic investigations are conducted in the Laboratory's Cotton Fiber Division under the leadership of Dr W Kyle Ward, Jr.

Dr Wayne A Sisson

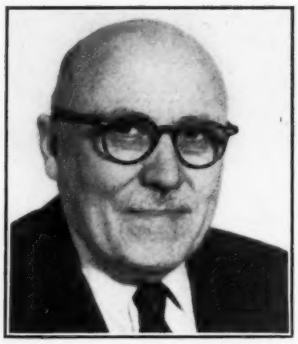
The advisers serve for four-year periods, one new appointment being made annually. Attending will be: newly appointed Dr Wayne A Sisson, Chemical Research Department, American Viscose Corporation, Marcus Hook, Pa; Dr Harold M Spurlin, Technical Assistant to the Director, Hercules Experiment Station, Wilmington, Del; Dr Emil Heuser, Consultant, 339 Vista de La Playa, La Jolla, Cal; and Dr Helmut R R Wakeham, who is serving temporarily for Dr J H Dillon, Director, Textile Research Institute.



Dr Helmut R R Wakeham

NAMES IN THE NEWS

Ben Verity



Leonard S Little

• Ben Verity Retires After 62 Years in the Industry

On the occasion of his retirement after 62 years service to the textile industry, Ben Verity was tendered a dinner by his many friends on April 6 at the Wannamoisett Country Club in Rhode Island. Carbic Color and Chemical Company, Inc, his employer for the past sixteen years, sponsored the event, at which he received a miniature green house.

Born on January 14, 1871, Mr Verity received his education at Yorkshire College (now Leeds University). He started his career in 1889 with the Walpole Dye and Chemical Company and then became assistant superintendent of the Magog Print Works of Canada, part of the Dominion Textile Company. After his marriage to Sara Rowstron of Montreal in 1907 he became associated with the American Printing Company in 1911.

Among his many friends at the dinner were Elliot Broadbent, Glenlyon Print Works, who acted as toastmaster; P J Wood, Royce Chemical Co; Arthur Hirst, Standard Chemical Products, Inc; J Robert Bonnar, General Dyestuff Corp; George Wood, Apponaug Co; Thorwald Larson and Carl W Kuhl II, Carbic Color and Chemical Co, Inc.

Mr Verity was a member of the American Chemical Society and the Society of Dyers and Colourists (the latter for nearly fifty years). He is an honorary member of the Society of the Chemical Industry, a charter member of the AATCC and a past chairman of the Rhode Island Section (1941-1942).

On his retirement, Mr Verity will make his home at Chatham, Cape Cod, Massachusetts.

• Leonard Little Honored at Luncheon

Leonard S Little was honored at a luncheon on March 20th sponsored by the Textile Square Club, New York, for his long service to the textile and textile chemical industries. About 175 persons from all branches of the industry were present. Mr Little recently retired from the du Pont company and established himself as a textile chemical consultant. He is chairman of the AATCC Executive Committee on Research and the AATCC General Research Committee.

Among the speakers who paid tribute to Mr Little were: C J Quinn, Sayles Finishing Plants, Inc; Herbert S Morrow, Calco Chemical Division, American Cyanamid Company; J Robert Bonnar, General Dyestuff Corporation; Walter R Howell, Bradford Dyeing Association; George Hotte, A M Tenney Associates; William P Fickett, Textile Fabrics Association; and P J Kennedy, E I du Pont de Nemours & Co, Inc. Harry Reimer, President of the Textile Square Club and Editor of *Daily News Record,* presided.

In his remarks Mr Little urged that more attention be paid to quality control, pointing out that the consuming public is entitled to the best efforts of the producers to supply them with garments and fabrics that give promise of maintaining a respectable appearance throughout a reasonable period. He stated that the textile industry had made remarkable strides in recent years which had been accomplished by the men in the laboratories and engineering departments, and by the men operating the mills and machines. However, he pointed out, the surface has just been scratched and there is a very serious shortage in most mills of trained chemists, engineers and plant control personnel. The textile industry is still considerably below par when it comes to maintaining research programs the industry should sponsor and the number and quality of scientifically trained men needed to fulfill requirements should definitely be increased. He urged that each executive review his research program and personnel training program to prepare for the need for greater progress in producing better and more desirable fabrics in the future. Mr Little said that we are at the threshold of an era of almost unbelievable progress in the textile industry and that by outstanding developments in chemical products and new mechanical and chemical processes we are able to obtain results in style and durability that would not have been possible 20 years ago. He stated that there was a serious need for better and more definite product promotion and simple truthful identification.

HECTOR C BORGHETTY has joined Rohm & Haas Company, Philadelphia, as assistant manager of their textile chemicals department in charge of product development and technical service, a newly created post. Mr Borghetty was formerly technical manager of the organic chemicals division of General Dyestuff Corporation, New York.

Two new junior chemists have been added to the staff at the Rensselaer, N Y, plant of the General Aniline & Film Corporation. GEORGE W HALEK, a junior member of the ACS, has started work in the Analytical Department and GEORGE B CERESIA has joined the technical staff. From 1944 to 1946, Mr Ceresia was employed as a chemical "trouble shooter" at the Norfolk Navy Yard, Portsmouth, Va.

HERMAN GOLDSTEIN has been named manager of production and development for the Warwick Chemical Division of Sun Chemical Corporation, according to an announcement by Ernest

Herman Goldstein

Nathan, president. Mr Goldstein has served Warwick in various capacities for several years.

Mr Nathan has also disclosed that S Y STRIBLING, former Southern service manager of Suntone Pigment Colors, has been named sales manager of that unit. Prior to his association with Suntone, Mr Stribling was associated with the Southern Bleachery and Print Works for many years.

S Y Stribling

Walter E Murray

WALTER E MURRAY has been elected president of the newly formed Crown Chemical Corporation, Providence, R I. Mr Murray was most recently vice president and general manager of the Warwick Chemical Company Division, Sun Chemical Corporation.

CAROL SCHREIBER is now assistant to the adver ising manager, Antara Products Division of General Dyestuff Corporation, New York, N Y.

CARTER G COOK, former development chemist with the A C Lawrence Leather Company, Peabody, Mass, has joined the research staff at Fabric Research Laboratories, Boston, Mass. While with A C Lawrence, Mr Cook was working on starches, glues and high polymeric materials and moisture conditioning as it is related to problems in the manufacture of leather products. At FRL, he will continue to apply his background in leather, in addition to facing problems in textile and paper technology which involve coating and finishing compounds.

C P Gordon, superintendent of the dyeing and finishing plant at Riegel Textile Corporation, Trion Division, announces that JACK WELBORN has been promoted from overseer of finishing to an assistant superintendent. D C ALEXANDER has been advanced to fill the overseer vacancy.

Mr Welborn has been with Riegel as overseer for five years. For 12 years prior to his military service he was with Pacific Mills, Lyman, S C. Mr Alexander has been with Riegel in the finishing department since the spring of 1938.

NEW PRODUCTS AND DEVELOPMENTS

• Glyco Increases Moisture-proofing Properties of Wax S-1167

The development of a new synthetic wax, Wax S-1167 by Glyco Products Co, Inc, 26 Court St, Brooklyn 2, N Y, is reported to have overcome the difficulty of protecting electrical components such as coil from moisture to prevent shorting out. As evidence of the construction of an effective moisture barrier, Glyco reports that coils impregnated with Wax S-1167 by a pressure-vacuum system have resisted shorting for a minimum of 30 cycles after being steeped in water containing a powerful detergent before every cycle.

The product is a completely synthetic dark organic wax with a ball and ring melting point of 120-125°C (248-257°F) and a flash point higher than 250°C (482°F). It is said to be very tough and does not tend to become very brittle at low temperatures. Good electrical properties and resistance to water and oils are reported, and when applied to metals as a hot melt, Wax S-1167 has good adhesion to the surface of the metal with a minimum of shrinkage. It is also indicated to be of interest for use as a waterproofing and laminant for paper, textiles, wood, etc, where its dark color is unimportant.

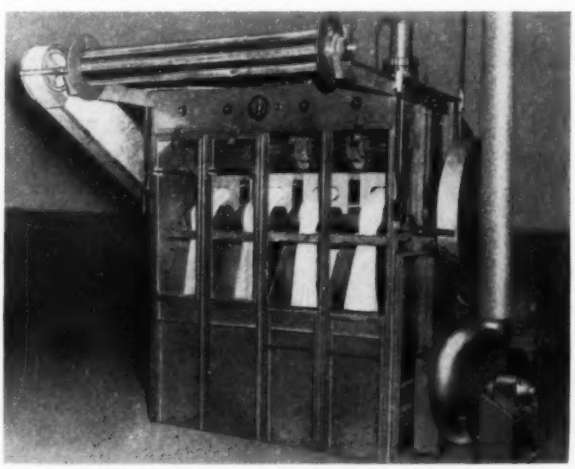
Wax S-1167 is available in commercial quantities and is currently quoted at 20 cents per pound in drums FOB Natrium, W Va. Specifications and samples are available from the manufacturer.

• R & L Improves Semicontinuous Crusher

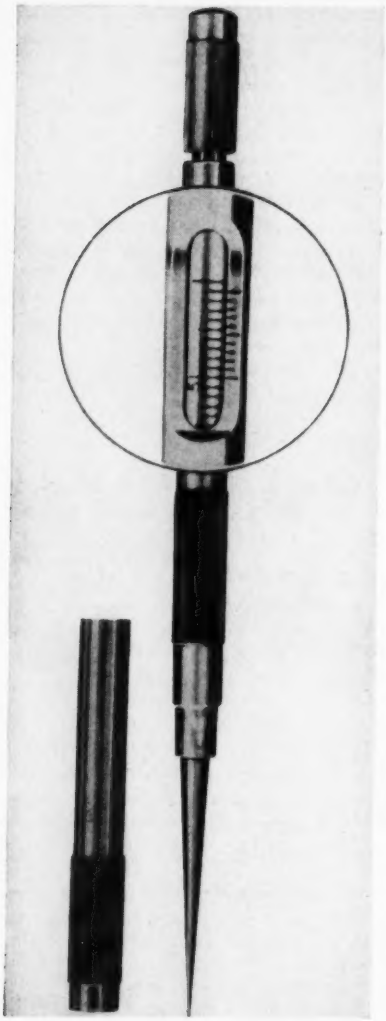
Two major improvements in their Semicontinuous Crusher have been announced by Riggs and Lombard of Lowell, Mass.

Top roll pressure equipment has been redesigned to give finger-tip pneumatic pressure control in an effort to obtain greater ease of operation and more uniform pressure from roll to roll.

Exhaust equipment has also been redesigned to effect more complete exhaustion of dust from the inside of the machine. Fabrics are said to come out much cleaner.



Riggs & Lombard Semicontinuous Crusher



Machlett Glass Tubing Gauge

• Precision Glass Tubing Gauge

E Machlett & Son, 220 East 23rd St, New York 10, N Y, is offering a precision micrometer type glass tubing gauge, which embodies a micrometer scale with vernier permitting inside measurements from 0.01 mm to 5 mm. The instrument is said to also be effective for measuring bores or circular openings for indicated sizes.

The needle is of specially hardened steel and is provided with protective cover.

Price: $8.00.

• Natural Waterproof Cotton Fabric Withstands New Orleans Test

The waterproof properties of a new type of tightly-woven cotton fabric, a research product of the U S Department of Agriculture's Southern Regional Research Laboratory, were borne out in a test at New Orleans' Pelican Stadium on March 20. Officials of the New Orleans Southern Association baseball team are currently testing the fabric in the form of tarpaulins for covering their batter's boxes and pitching mound, and as part of service test inauguration ceremonies, the fabric was sprayed with a hose.

Examining one of the tarpaulins made from a new tightly-woven cotton fabric developed at the Southern Regional Research Laboratory. Left to right: Mayer Mayer, Jr, a member of the Laboratory's Cotton Mechanical Processing Division; Dr G E Hilbert, Chief of the Bureau of Agricultural and Industrial Chemistry; and Dr C H Fischer, Directory of the Laboratory.

The fabric is constructed using a special loom attachment for dense weaving, and, it is stated, no resin or other chemical treatment is needed to make it waterproof. It is reported that 30% more filling threads are contained in comparison to ordinary cotton fabrics used for this purpose, yet at one-third the weight.

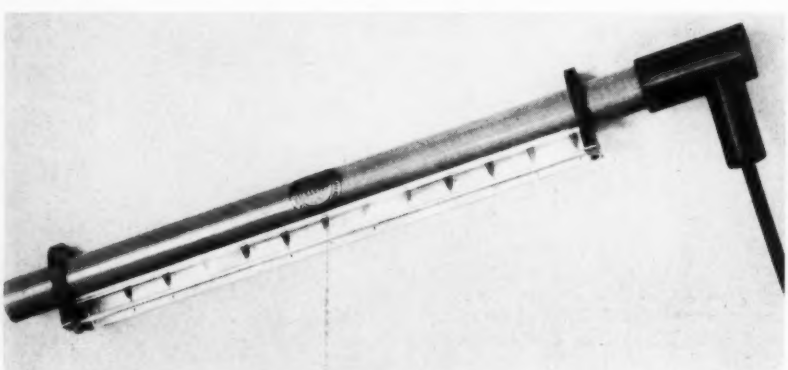
For the Pelican Stadiu mtest the fabric received a chemical treatment to protect it from mildew and other rot-causing microorganisms, but was given no protection against the penetration of water except that provided by the increased denseness of the fabric.

The tarpaulins under test will receive the normal use of coverings at Pelican Stadium. Laboratory officials will inspect them from time to time and will store them between baseball seasons, renewing the protection against rot as needed to prolong the life of the fabric.

• Oxy Neutralizer "Cold" Bar Improves Static Elimination

A more effective, safe method of neutralizing static electricity reportedly has been accomplished by Herbert Products Incorporated with the redesigning of their Oxy Neutralizer Bar. Through means in the interior construction, a new "cold" bar has been produced, which gives intense ionization at the emitter points, but is devoid of shock, sting and sparks.

The "Cold" Neutralizer Bar has an outside tube of approximately one inch diameter, with phosphor bronze spring emitter points spaced one inch apart and pro-



"Cold" Oxy Neutralizer Bar

jecting one half inch from the tube. For machines where material being neutralized, might, through slackened tension, fall upon the points or just touch them, a model is available with the points protected by a lucite shield on each side of the neutralizer bar. The lucite shields are held in position by substantial bakelite clamps. Effectiveness in eliminating static electricity is said to be equally accomplished either with the unshielded or shielded neutralizer bar.

The Bar is energized by high voltage alternating current from a transformer, so designed as to have extraordinarily high impedence in order to limit the current flow in the secondary to a value not in excess of 2 M A. Also featured is a connector that cannot expose any electrically "live" connections of the secondary line from the transformer, even though the power cable should be disconnected while the power is "on."

The manufacturer has designed a complete line of brackets to mount the bars on various machines.

Herbert Products Inc is represented in the United States and Canada by American Textile Engineering, Inc, Arlington, N J.

• Consolidated Heat Generator

As an answer to the textile industry's demand for efficient, flexible, low-cost steam generation, the Consolidated Boiler Corporation (1631 Hyde Park Ave, Hyde Park, Mass) has developed a series of boilers specifically for the process industry, known as the Consolidated Heat Generator, Series 1500.

The boiler is constructed to operate on present or old type process equipment and can furnish three types of steam at the same time or separately. Options include a saturated steam at 220-290°F in 15 minutes, some saturation of the steam with temperatures of 280-400°F in 20 minutes, or a dry steam with temperatures of 390-550°F in 35 minutes. An above average recovery at all times is guaranteed by Consolidated.

The manufacturer reports that the Consolidated Heat Generator, operating in conjunction with a tenter-drier in a prominent bleachery with improvised steam nozzles, made the following gains in the speed of drying material (heavy goods):

Material (yards to the pound)	*Gain in yards over previous runs*
2.8	13
3.15	10
5 to 6	6

Overall gains in speed and water evaporation were reported at 21.6% and 21% respectively.

Claims of improved fabric texture and appearance are also made by the manufacturer.

Dimensions: 65" high, 29" wide and 43" long.

No licensed engineer is required for the unit, which is fully automatic with artificial draft included.

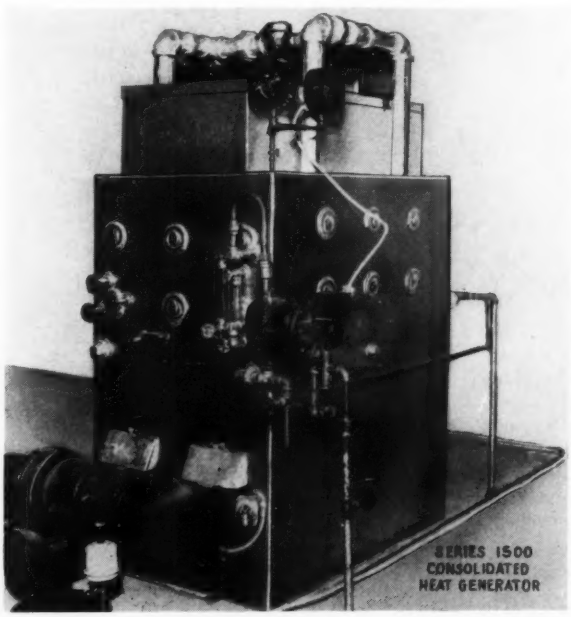
• Pocket Size pH Meter

A pocket-size pH meter and companion probe unit for on-the-spot pH determinations is now offered by Analytical Measurements, Incorporated, 585 Main Street, Chatham, N J.

Completely self-contained with batteries in a bakelite case 3" x 5⅞" x 2½", this instrument is furnished, camera fashion, in a case with plastic tubes of buffer and KCl solutions. Total weight is 3 lbs. Both water-proof and fungus-proof, the case comes with a combination hand-and-shoulder strap.

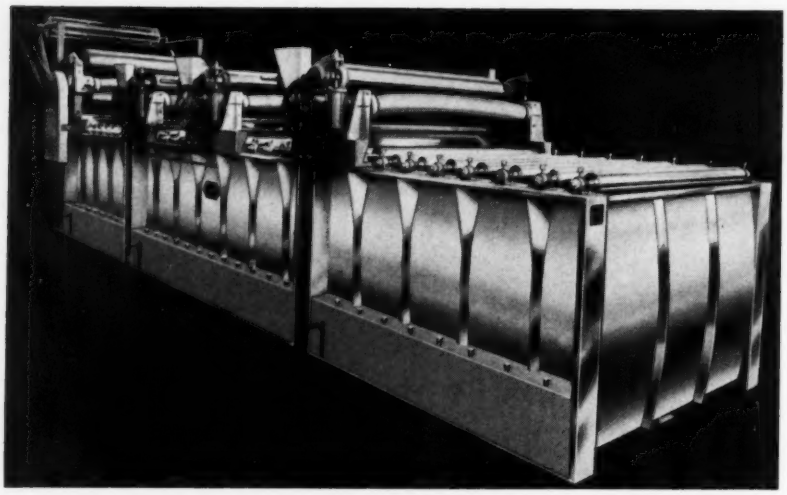
Supports and beakers are eliminated by combining the calomel and glass electrodes with the sample holder, in a single polyethylene probe unit. This idea of combining the sample holder with the electrodes (Patents Pending) is said to completely protect them and a sample volume of only 0.5 ml is required.

The meter is scaled from 2 to 12 pH, and a simple adjustment gives readings from 0 to 14. Accuracy of 0.1 pH is reported to be obtainable. Hearing-aid type batteries provide up to 1300 hours of operation. The electrometer tube, switch and input connector are sealed in a single unit to avoid high humidity difficulties, with the one-knob control and continuous reading features aimed at simplifying operation for untrained personnel. Grounded samples can be directly measured because of no external power connections. The instrument and electrode are completely shielded.



Series 1500 Consolidated Heat Generator

Pocket-size pH Meter and Probe Unit



Rodney Hunt "Tensitrol" Open Width Washer

• New Application of Tensitrol Washer

Rodney Hunt Machine Co, Orange, Mass, reports that several leading manufacturers of rayon suitings are now using Tensitrol Open Width Washers for washing resin-treated rayons after curing with highly successful results, eliminating the need for rope washing.

One of several tests conducted to compare results with those obtained by rope washing in a beck was conducted as follows:

A sufficient yardage of spun rayon shirting was padded with the proper chemicals, dried, and cured at the pilot plant of the firm conducting the trials. Half of the fabric was then taken to a rayon finishing plant where a three-box Rodney Hunt Open Width Tensitrol Washer was available. The fabric was washed through this machine using detergent and alkali in the first two boxes and rinse in the third.

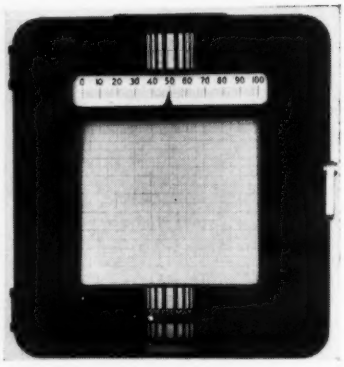
The other half of the fabric was retained at the pilot plant where it was washed thoroughly in a dye beck in batch form. The two lots of fabric were then subjected to the usual inspection and testing for fabrics of this type.

Results of the test as listed by Rodney Hunt:

(1) No tension was apparent on the fabric while running through the Tensitrol Washer. The hand of fabric was the same with both the dye beck-washed and the Tensitrol-washed shirting. Working loss in both fabrics was the same.

(2) Scorch tests showed no differences in the degree of washing obtained from the standard dye beck method and the Tensitrol Washer.

(3) Shrinkage tests showed that the fabric washed in the Tensitrol Washer was a good or better than the fabric which had been beck washed.



Illustrated above is the Leeds and Northrup Adjustable Range—Adjustable Zero Suppression Speedomax Recorder (See March 5 ADR, page 172).

LITERATURE

Jarecki Valve Price List

Jarecki Valve Division
H K Porter Company, Inc
Tulsa, Oklahoma

Contains information on sizes, materials of construction, and prices of the Jarecki line of valves, including bronze valves and cocks, iron valves and cocks, iron and brass unions, and expansion and swing joints.

The manufacturer states that the valves are well-proportioned, properly designed, constructed of analysis-proved metals of high tensile strength, and possessive of a large factor of safety over their rated working pressures.

The list is available to manufacturers, jobbers, contractors, etc. Inquiries should be directed to P J Gallagher, general sales manager, Drawer 2650 at the above address.

"Textile Research and Development Facilities of Philadelphia Textile Institute"

Philadelphia Textile Institute
School House Lane and Henry Avenue
Philadelphia 44, Pa

Designed to win for PTI application for research projects of all kinds for which the Institute's varied equipment and personnel are suited, the booklet describes in words and pictures the excellent facilities for research projects at the new school and tells briefly of the many such projects already completed for industry, government, and the armed forces.

Included is a list of the types of projects the Institute is capable of undertaking as well as a photographic tour of each department, with indication of the kinds of equipment and caliber of personnel available.

The booklet was prepared cooperatively by the Institute's faculty, Boards of Governors and Trustees, and the Philadelphia advertising firm of Abner J Gelula and Associates.

Calco Technical Bulletin #818

American Cyanamid Company
Calco Chemical Division
Bound Brook, N J

The Olney Medal Paper for 1951, "A Review of Textile Coloring and Finishing," by Dr George L Royer, which appeared in the December 11, 1951 issue of the AMERICAN DYESTUFF REPORTER, has been reprinted for distribution as Calco Technical Bulletin #818. Copies may be obtained by writing Calco's Advertising Department.

• GDC Releases Seven New Circulars

The General Dyestuff Corporation, 435 Hudson Street, New York 14, N Y, has announced the release of seven new circulars:—

G-665—Igepal CO Extra High Conc
G-668—Fastusol Blue L5R
G-671—Solidogen WF Powder
G-674—Blancophor R
G-675—Diazo Brown RA-CF
G-676—Alizarine Fast Grey BLN-CF
G-677—Monochrome Brown EBC Conc CF

Reviews of each product will be contained in a subsequent issue of the AMERICAN DYESTUFF REPORTER.

a fast printing black
for delicate fabrics

CALCOPHENYL BLACK BASE

Fastness Properties

	On Cotton	On Acetate-Rayon
Fade-Ometer	3–4	6
Wash Test No. 3	4	5
Crocking:		
Dry	5	5
Wet	3	3–4
Acid Perspiration	4	4–5
Alkaline Perspiration	5	5
Dry Cleaning	5	5
Wet Dry Cleaning	4–5	4–5

Calco

A fast bloomy black with excellent running properties, Calcophenyl Black Base is recommended for acetate, viscose, acetate mixtures, and cotton printing.

Calcophenyl Black Base works well on synthetic fabrics and cotton to produce a rich, ungreenable black without tendering of the fibers.

Calcophenyl Black Base offers the following additional advantages:

- **Consistent printing properties on naphthol-prepared fabrics**
- **No tendering action**
- **Excellent running properties with no tendency to cause etching of the doctor blade**

Ask your Calco representative for a sample and information on Calcophenyl Black Base.

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION, DYESTUFF DEPARTMENT
BOUND BROOK, NEW JERSEY

A special notice to manufacturers of textile wet-processing products.

On October 1st, 1951, the American Dyestuff Reporter as official publication of Proceedings of American Association of Textile Chemists and Colorists will publish an important

CONVENTION NUMBER

in connection with the 30th Annual Convention of the Association, at the Hotel Statler, New York, October 17-18-19, 1951.

•

Advertising space reservations already received for this important issue indicate that it will be the largest permanent record of individual product development for textile wet-processing that we have ever published.

We note a definite trend on the part of advertisers to prepare special copy for this individual issue. This will include factual information on all products produced – photographs of manufacturing and laboratory facilities, and specific information regarding technical cooperation available.

This decision to use factual copy (in this particular issue) is attributable to two important factors –

FIRST: This will be the largest Exposition ever sponsored by the AATCC and the greatest attendance in the Association's history is anticipated. One booth at the Exposition will be a focal point from which copies of the Convention issue will be distributed.

SECOND: The importance of acquainting those who are responsible for the expanding program of Government Procurement with just what each individual organization is capable of producing for the rearmament program.

A number of advertisers have reserved two facing pages in order to show photographs of plant and laboratory facilities, distribution warehouses, etc., as well as a complete listing of products.

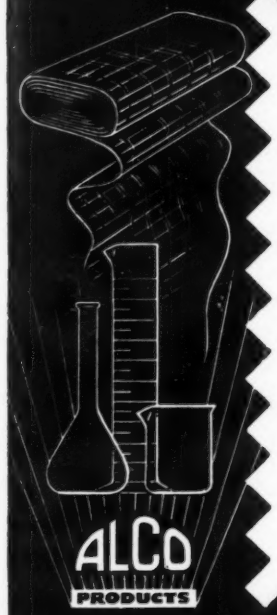
We suggest that all advertising copy be factual and complete so that each organization can show their individual contribution to the attainment of a self-contained American chemical industry.

Advertising space reservations should be made now.

•

HOWES PUBLISHING COMPANY, 44 East 23rd Street, N. Y. 10, N. Y.

M. D. REESER
Advertising Manager



VULCANOL*

A Group of Latex Compounds for Sizing, Coating and Impregnating Textile Fabrics.

ALCOGUM

Synthetic Thickeners for Latex Compounds.

VULCARITE

Dispersions of Latex Compounding Chemicals.

* * *

Technical information and samples available promptly upon request.

* Registered Trademark

ALCO OIL & CHEMICAL CORPORATION

TRENTON AVE. and WILLIAM ST., PHILADELPHIA 34, PA.

SOUTHERN DISTRIBUTORS

WICA COMPANY INC.

CHARLOTTE, N.C.

RECORDING SPECTROPHOTOMETER INDISPENSABLE

for color analysis and control at Interchemical

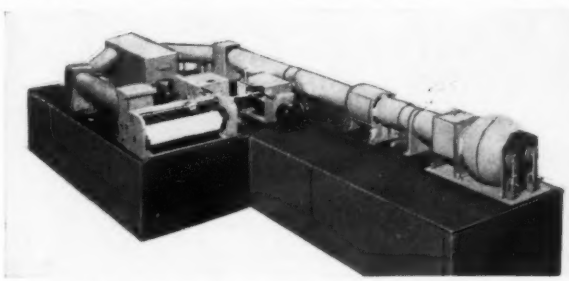
Dan Smith, color expert at Interchemical Corporation, New York City, says "Our company finds the G-E Spectrophotometer indispensable for color work. It is the only way to insure exact color control and meeting of color standards."

With the G-E Recording Spectrophotometer:

- Control color processes
- Do rapid colorimetric analysis
- Get an automatic linear curve of reflectance
- Set up color standards scientifically

DYES • PAINTS • CHEMICALS • INKS

One of the first G-E recording spectrophotometers, this instrument has been in service at Interchemical for 15 years.



Latest model G-E recording spectrophotometer. Due to the excellent results obtained with the original model, Interchemical has added three of these to its facilities.

Section E 687-59, Apparatus Dept.,
General Electric Co., Schenectady, N. Y.

Please send me bulletin GEC-307 on your recording spectrophotometer.

☐ Planning an immediate project ☐ For reference purposes

Name ..... Position .....
(please print)

Street .....

City ..... Zone ..... State .....

GENERAL ELECTRIC

An Invitation to the Entire Knitting Trade!

Announcing

The 40th (and by far the largest!)

KNITTING ARTS EXHIBITION

Under the Auspices

NATIONAL ASSOCIATION of HOSIERY MANUFACTURERS

APRIL 30 thru MAY 4, 1951 • AUDITORIUM ATLANTIC CITY, N. J.

It's Keyed to Your PRESENT Problems

Never have manufacturers faced so many problems . . . so many *complex* problems! Only one thing is sure: All must improve production and at the same time cut costs where possible. This calls for the maximum efficiency of operation and management. One needs to be fully familiar with the latest equipment, materials, methods and services.

At Atlantic City, the week of April 30, the great Auditorium will be turned into the world's largest knitting mill.

> More than 200 leading manufacturers of knitting, winding, dyeing, sewing, boarding and other machinery; furnishers of mill supplies, yarns and allied products will show their newest machines, processes, products and mechanical features.

EVERY MILL OFFICIAL, COMPANY EXECUTIVE, PURCHASING AGENT, SALES MANAGER AND KEY MAN IN ALL PHASES OF MILL OPERATIONS WILL FIND SOMETHING HELPFUL AT THIS GREAT EXHIBITION.

MAKE YOUR PLANS NOW TO ATTEND. Atlantic City provides excellent hotel accommodations at a wide range of rates — attractions for relaxation and entertainment.

Tickets may be secured free from exhibitors or from the management of the Knitting Arts Exhibition.

For further information write

ALBERT C. RAU, *Manager* 332 Park Square Building, Boston, Mass.

Stantex* Coning Oils for NYLON

For hosiery, weaving and tricot yarns Stantex tested and proven oils of uniform high quality and stability insure—

- **Protection and lubrication for yarn and size**
- **Better cone build-up**
- **Improved knitting and weaving results**
- **Elimination of static**
- **Ease of removal in scouring**

STANTEX 125 **STANTEX 127**

STANTEX 152 **STANTEX 172**

Our experienced representatives will assist you to select the proper oil for your requirements. Write for full information.

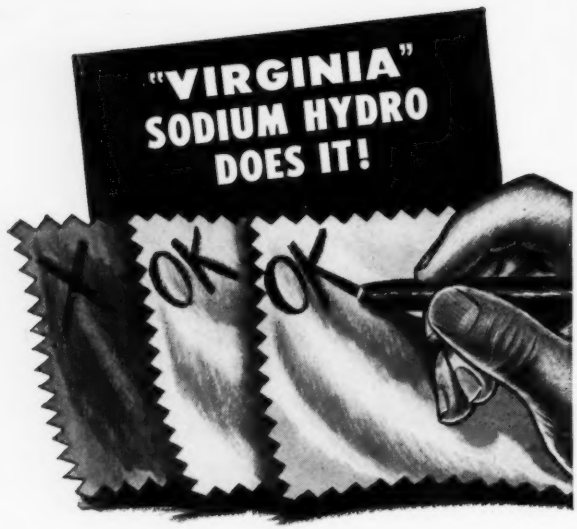
STANDARD CHEMICAL PRODUCTS, Inc.

1301 JEFFERSON STREET, HOBOKEN, NEW JERSEY

Chattanooga, Tenn. • Paterson, N. J. • Providence, R. I.
Sunbury, Pa. • Sacramento, Cal. • Greensboro, N. C. • Leaksville, N. C. • Salisbury, N. C.

Manufacturers of: PYROTEX • STANDAPOL * • RETARDINE * • STANTEOSINE • STANDAFIN

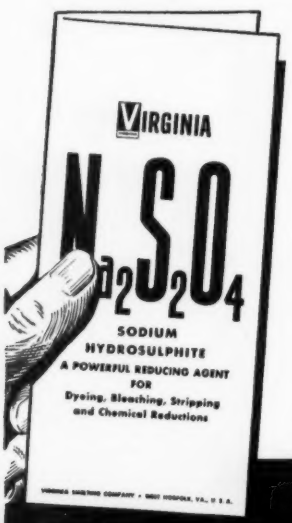
* Trade mark



Matched Shades Are a "Must"

Skilled dyers find "Virginia" Sodium Hydrosulphite a big help in assuring accurate matching of shades. The high strength, uniformity, and quality of "Virginia" Hydro are well known. Mill after mill places great reliance upon its proved properties as a stripping and reducing agent, and its exceptional stability in the bath.

Concentrated "Virginia" Hydro ($Na_2S_2O_4$) is unvarying in quality, drum after drum. It is stable, free flowing, uniformly crystalline, rapidly dissolved in water. To test its advantages in *your* dye room, write for a free sample. We'll send it promptly, along with our folder describing the varied applications of this chemical. VIRGINIA SMELTING COMPANY, West Norfolk, Virginia.



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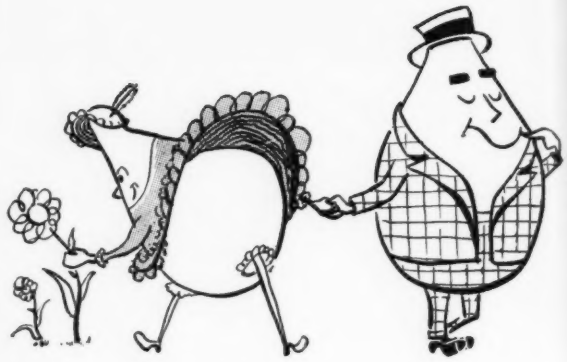
SINCE 1898



how to get a softer "hand" and a whiter "bottom"...

...THE *Versenes**

VERSENES* VS CONTAMINATION

A softer "hand" and a whiter "bottom" can come only from cleaner fibres. This means that regardless of the textile itself or the wet process involved, fibre surfaces must be free from chemical contaminants and impurities — including insoluble soap deposits. Through the new chemistry of chelation, Versene permits you to achieve these highly desirable objectives.

VALUE OF VERSENES*

As powerful organic complexing agents the Versenes give you exacting chemical control over cations in solution. Thus do they prevent contamination and assure cleaner fibres. The Versenes are chemically known as the sodium salts of ethylene diamine tetra acetic and other polyamino acids. Available in liquid or powder form, they are completely stable at high temperature and at all pH's.

VARIOUS VERSENES*

Versene (regular), the original *Versene,* is a most efficient general complexing agent. It softens water completely and permanently *without* precipitation. *Versene Fe 3* prevents hard water deposits and iron stains. *Versene Fe 3 Specific* is the most powerful iron complexing agent known in the normal pH range. *Versene* T prevents and removes iron deposits from fabric treated with caustic.

"INDUSTRY'S MOST MODERN CHEMICALS"

Through the new chemistry of chelation, the Versenes can definitely help you better your textile formulations and processes. Write Dept. E for your free copy of Technical Bulletin No. 2. Send for samples. *Trade Mark

BERSWORTH CHEMICAL CO.
FRAMINGHAM, MASSACHUSETTS
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APPLICATION	NAME	COTTON	RAYON	WOOL	NYLON	SILK	LINEN	CHEMICAL NATURE
ANTI-SLIP	**WEAVE-LOK***		X		X			water-soluble processed natural resin
ANTI-SLIP	**FORMASET* HG**		X	X	X			inorganic polymer semi-durable
COATING								
NON VOLATILE	**PLASTISOL**	TEXTILES, PAPER						vinyl resin dispersions
VOLATILE	**ORGANOSOL**	TEXTILES, PAPER						vinyl resin dispersions
COLOR FIXATIVE	**WARCOFIX***	X	X	X	X	X	X	quarternaryammonium compound
COLORS, DISPERSED	**SUNTONE***	VINYL						pigments dispersed in resinous and chemical plasticizers
COLORS, PAD DYEING	**SUNTONE***	X	X	X	X	X	X	dispersed pigments and resinous binders
COLORS, PRINTING	**SUNTONE***	X	X	X	X	X	X	dispersed pigments and resinous binders
COLORS, PRINTING	**SUNTONE***	PLASTICS						dispersed pigments and resinous binders
FINISHES								
BODYING AGENTS	**SETOLE* AF**	X						aqueous dispersions of thermo-setting resins
CRUSH RESISTANT	**FORMASET* SN**		X					methylolurea type thermo-setting resin
DULLER	**ANTILUSTEROLE***		X		X			aqueous dispersion of inorganic pigments
FIRE RETARDANT	**WARCONYL* A**	X	X					blend of inorganic salts
GLAZING (DURABLE)	**FORMASET* 10-D**	X						dimethylurea-ether polymer
GLAZING (DURABLE)	**FORMASET* SN**		X					methylolurea type thermo-setting resin
MILDEW PROOFING	**KUPRATE***	X	X	X	X	X	X	solubilized copper 8 quinolinolate
MILDEW PROOFING	**G-4 EMULSION-20**	X	X	X	X	X	X	emulsion containing 20% G-4. Compatible with emulsion-type water repellents.
RIBBON FINISH	**SETOLE* D EXTRA**		X					water-soluble alkyd resin
SEWABILITY FINISH	**WARCO* A 221**	X						non-ionic emulsion
SHRINK RESISTANT	**FORMASET* SR**	X	X					ketone aldehyde type thermo-setting resin
SHRINK RESISTANT	**FORMASET* SN**		X					methylolurea type thermo-setting resin
SHRINK RESISTANT	**FORMASET* 10-D**		X					partially polymerized urea-formaldehyde type resin
SHRINK RESISTANT	**FORMASET* C**	X	X	X	X		X	controlled formalizer of fibers—highly wash resistant
SOFTENERS								
ANIONIC	**APPRETOLE***	X	X				X	alkyl amide dispersion
CATIONIC	**APPRAMINE***	X	X		X		X	substituted fatty amide
HEAVY-BODIED	**TORRIDEX***	X	X					sulfonated tallow
OXIDATION RESISTANT	**WARCOLENE* 171**	X	X				X	sulfated fatty acid ester
WATER REPELLENT DURABLE	**NORANE* R**	X	X					chloromethylated quaternary ammonium compound
WATER REPELLENT DURABLE	**NORANE* W**			X	X			wax emulsion plus metal salt complex
WATER REPELLENT RENEWABLE	**IMPREGNOLE***	X	X	X	X	X	X	wax emulsion with polyvolent salts
GAS FADING INHIBITOR	**WARCO* GFI**		X					high molecular weight amino compound
GAS FADING INHIBITOR	**WARCO* GND**		X					mixed organic amines (non-durable type)
KIER BOILING COMPOUNDS	**KIEROLE***	X	X				X	sulfonated fatty acids
KIER BOILING COMPOUNDS	**COLOROLE***	X	X				X	sulfonated fatty acids
LUBRICANT (YARN, FABRIC)	**WARCOLENE***	X						solubilized oil
LUBRICANT	**WARCO* A 221**	X						non-ionic emulsion
PENETRANTS—REGULAR	**WARCOSOL***	X						sodium alkylnapthalenesulfonate
PENETRANTS—NON-FOAMING	**WARCOSOL* NF**	X	X	X				blend of organic esters
PENETRANTS—MERCERIZING	**EUMERCIN***	X						cresylic and non-cresylic types
PIGMENT PRINT BINDERS	**SUNTONE* CLEARS**	X	X					emulsified resinous compounds
PIGMENT PRINT BINDERS	**FORMASET* 20**	X	X					partially polymerized urea-formaldehyde resin
TAR AND GREASE REMOVER	**LANOLE***	X	X	X	X			detergent solution in organic solvent
SYNTHETIC DETERGENT	**SULFANOLE* KB**	X	X	X	X	X	X	sodium alkylarylsulfonate
SYNTHETIC DETERGENT	**SULFANOLE* CP**	X	X	X	X	X	X	sulfated fatty amide
SYNTHETIC DETERGENT	**SULFANOLE* S GEL Conc.**	X	X	X	X	X	X	sulfonated fatty amide
SYNTHETIC DETERGENT	**SULFANOLE* AN**	X	X	X	X	X	X	fatty acid amine condensate
WETTING AND REWETTING	**WARCOSAN*B Conc.**	X	X					sodium alkyl ester sulfate
WOOL SCOURING	**LANOLE* B**		X	X				stabilized organic solvent soap compound

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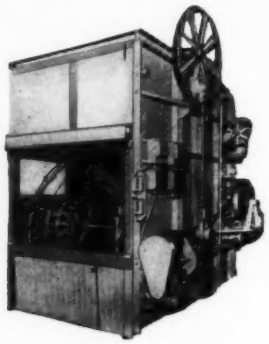

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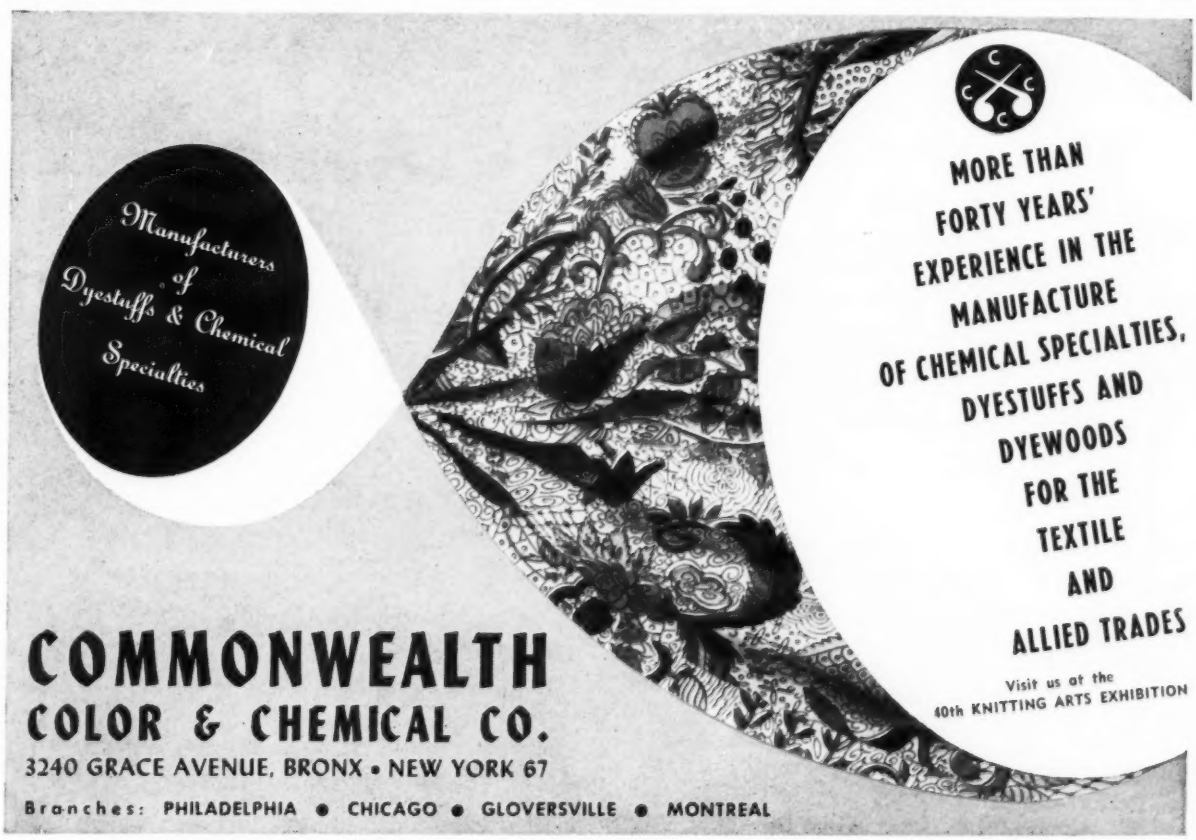
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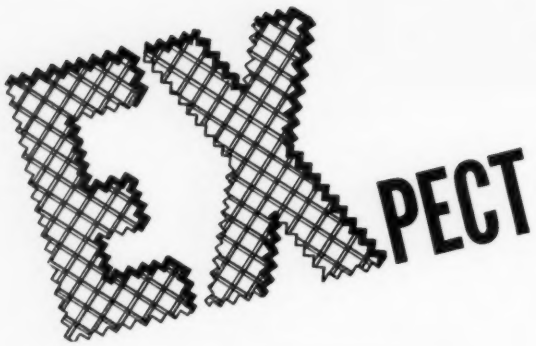

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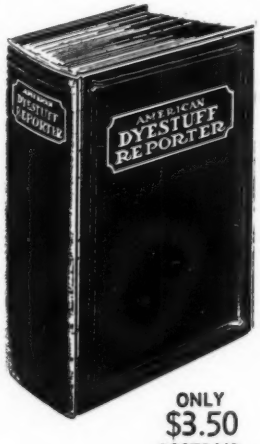

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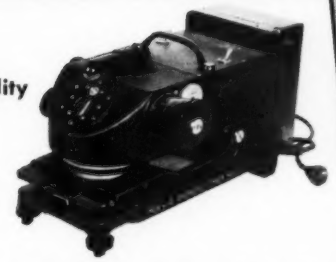

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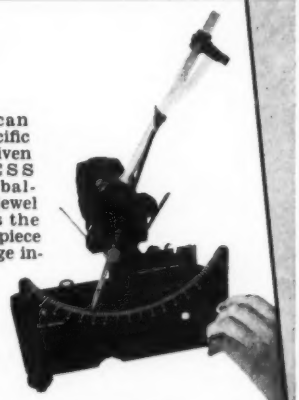

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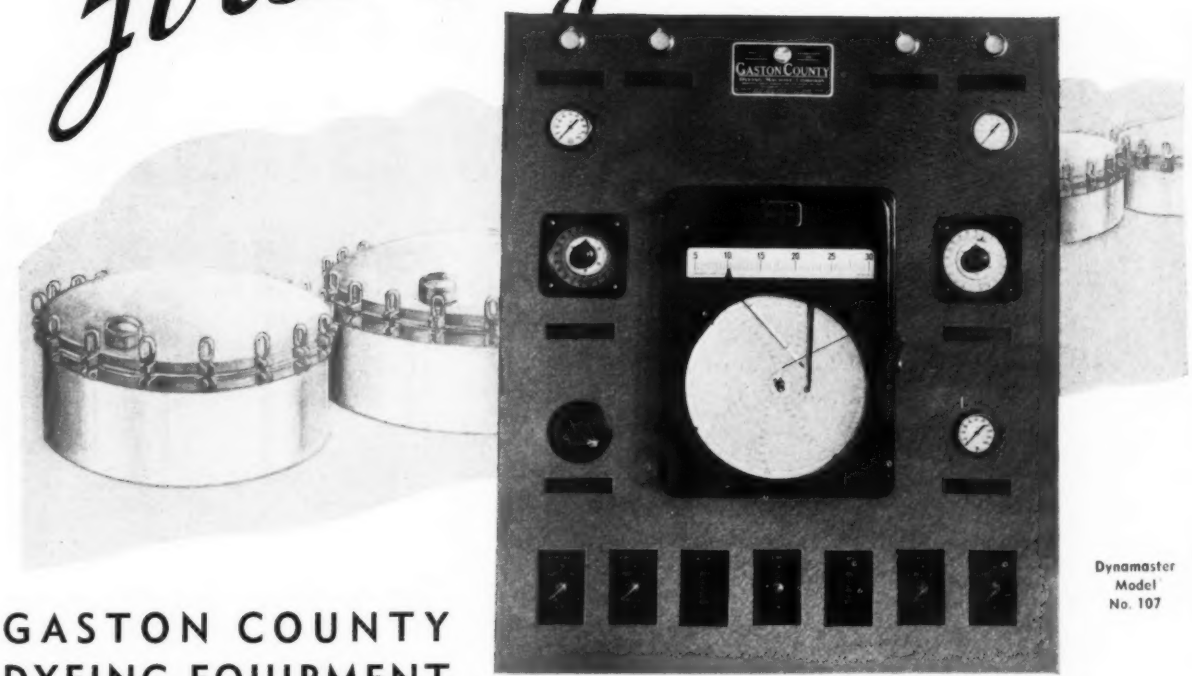

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